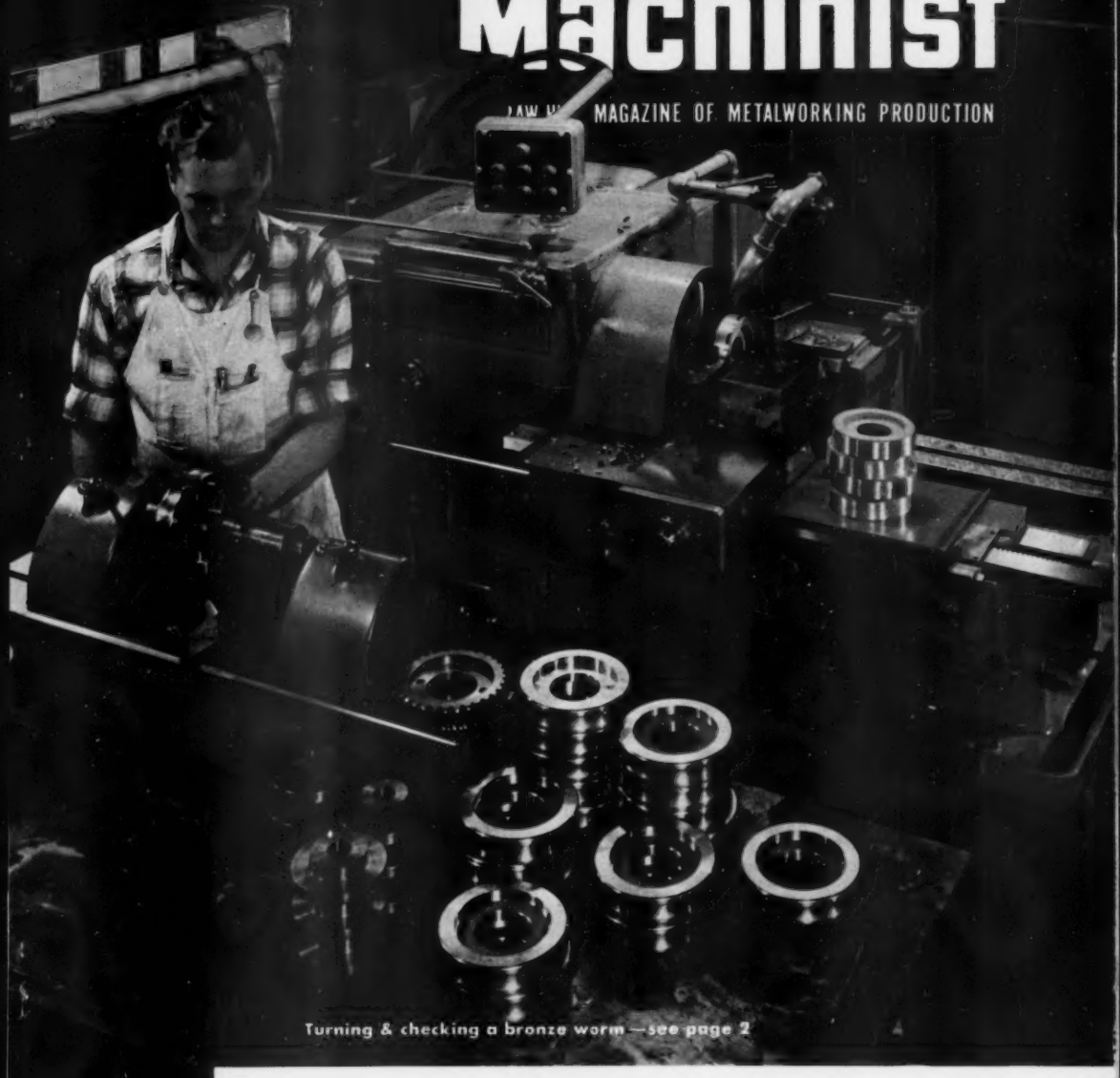
MARCH 19, 1951

American Machinist

MAGAZINE OF METALWORKING PRODUCTION



Turning & checking a bronze worm—see page 2

How to Spin Metals—A SPECIAL REPORT

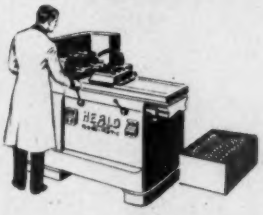
Telescope Aligns Diesel Bearings

Multi-thread Hobs at Chevrolet

BRAKE PRODUCTION BREAKS RECORD

for quantity

(up 100%)



for quality

(higher precision)

. . . with a new Heald Bore-Matic

This is an old, familiar story—because breaking production records is a Heald specialty.

In this instance, an automotive manufacturer was able to *double* the production of hydraulic brake cylinders when a new Heald Model 221 Bore-Matic replaced older, less efficient equipment. Quality of the finished parts was greatly improved, too—with higher precision and better finish.

Equipped with triple boringheads and a three-station, hydraulically operated work holding fixture, this machine bores and plunge faces three cylinders at a time—in one, high-speed, fully automatic cycle. Fixture clamping and unclamping is controlled by push buttons on the bridge, for fast, easy loading and unloading of parts.

Remember—when it comes to precision finishing, it pays to come to Heald.

This three-station, Model 221 Bore-Matic bores and faces automotive brake cylinders twice as fast as previous equipment.

HEALD

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

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Chips and QUIPS

Worm Turns . . . Bronze wormwheels and steel hubs for various sizes are turned, bored, and faced in two operations on this Sundstrand Model 8A automatic lathe at Baughman Mfg. Co., Jerseyville, Ill. Floor-to-floor time on the largest part is 55 sec, at a speed of 365 sfpm and feed of 0.014 ipr. Cycle on any part is completely automatic, so the operator can check the previously finished part simultaneously. It is arbor-mounted so faces can be checked for runout in a Sundstrand bench center.

Spinning . . . For several years, we have been trying to get a comprehensive discussion of that ancient, but very useful, process: metal spinning. But its practitioners are a secretive group; they've learned what they know the hard way and are little disposed to tell about it. We've had stories on typical spinning jobs, some general tabular data; now we have a thoroughgoing 16-page Special Report written by a Canadian (see biography). It includes data on cost of spinning vs that of pressing, speeds, spinnability, equipments, and methods.

Teeth Are Characters . . . We couldn't forebear a slightly facetious title for our lead article; after all, who ever heard of gear teeth that print letters and numbers? IBM makes such gears, though, by rolling the characters into the rim of a steel disk, then hobbing out between characters to make teeth. Here, in pictures, is the story; including details of a draw-in arbor that simplifies loading—and, more importantly—unloading; of a special mount for locating blanks within 0.001 in.

Shop Talent . . . We present another in the popular series of "Talented Tooling" spreads, this one including pointers from such widely scattered points as California, Canada, Ohio, New York, Michigan and Massachusetts. There's a tool carrier that holds up to 26 bits, a dummy contouring setup to check lathe tracers, a Carboloy flycutter on aluminum, a grooving tool for pulleys.

Eustest . . . Zelf Tool & Die Works in New York City, the shop that will rent you use of a machine tool or bench and hand tools by the hour, plus advice if you need it, is getting much deserved publicity recently as the world's only "make-it-yourself' machine shop. If you want details, go back 14 months (*AM*., Jan. 9, 1950, p. 92).

Multi-thread Hobs . . . John M. Finally, master mechanic of the Chevrolet-Muncie Div., GM, reappears in our pages in this issue (earlier article Feb. 19) with the story of his division's use of unground multi-thread hobs and automatic chucks. These permit increased feeds on hobbing machines and shorter cycle time, thus cut production costs.

Aligning Telescope . . . Electro-Motive Div., GMC, has abandoned piano wire and such systems for checking alignment of bearings in big-diesel crankcases, is now using a telescope and sighting targets. It's fast and easy and very accurate. Wm. Jacoby, supt of gage control, shows you the principles in two quick pages.

Crane-rail Check . . . Watervliet Arsenal has replaced cumbersome and difficult methods of checking crane-rail spacing with a special fixture that is fast and accurate. You'll be interested in the details of its design. It's a fast single-pager from the man who designed the fixture.

Coming . . . April 2 *AM* will carry the second of the series of Special Reports on training, this one on measuring tools. There will also be a description of some unusual progressive dies from Voelkert, another of a multiple spotwelder, a third of a new method of making plant layout prints that cut costs 90%. We also report a study on furnace brazing, installment eleven on carburizing, and other features.

SPINNER . . . J. W. Langbridge, project engineer at Aluminum Goods, Ltd., Toronto, has had 32 years of experience in design and engineering on presswork, spinning, permanent-mold casting, screw-machine tooling for aluminum, machine design, etc., plus 8 years shopwork in all divisions. Thus his current Special Report on Spinning is based on a solid foundation. He has talked on drawing and spinning before the ASTE, ASM, and other societies; and lectured on the subject at Ryerson Institute, Toronto. He has also written extensively on drawing and spinning. He is a member of the ASME, ASM, ASTE, and the Ontario Assn of Professional Engineers.

QUENCHING PRESSES TO MEET *YOUR* REQUIREMENTS

GLEASON NO. 16 QUENCHING PRESS FIRST

Gleason Quenching Presses are an integral part of every industrial unit where the heat treatment of metal parts is required. If your needs are for a press capable of distortion-free quenching at faster production rates than heretofore possible, Gleason Works now provide three different models; the No. 16 with a 15" capacity, the No. 26 with a 24" capacity, and the No. 36 with a 36" capacity.

GLEASON NO. 26 QUENCHING PRESS NEXT

and NOW...

GLEASON NO. 36 QUENCHING PRESS

Note the advantages the New Gleason Quenching Press provide:

- **Controlled quenching at faster and safer production.**
- **Simplified set-ups.**
- **Metallurgically correct oil flow.**
- **Safer loading.**
- **Quenching without distortion.**

Write for literature. Send in prints of parts to be quenched for our recommendations.

BUILDERS OF BEVEL GEAR MACHINERY · GLEASON · FOR OVER EIGHTY-FIVE YEARS

GLEASON WORKS

1000 UNIVERSITY AVENUE · ROCHESTER 3, NEW YORK

All set to

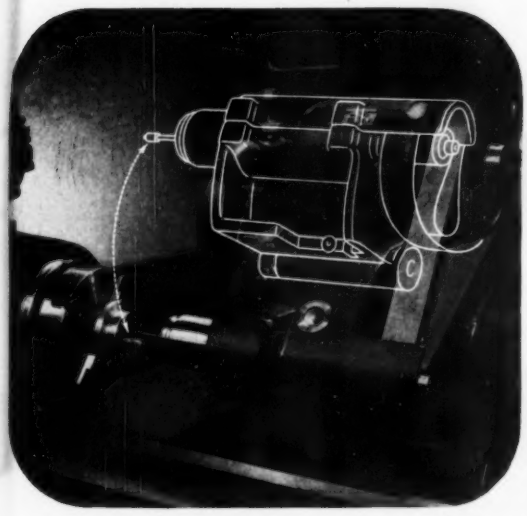
YOU CAN START QUICKER

WITH CINCINNATI FILMATIC HYDRAULIC UNIVERSALS

Tomorrow, or any time when you decide to re-examine your shop costs, make a simple pie chart of your precision grinding operations, like this:

You may be surprised to find that set-up time usually exceeds the grinding time for small quantities; perhaps 60% or more of the total. Then make another pie chart of the same operation, based upon CINCINNATI FILMATIC Hydraulic Universals. You'll find that it will look something like this:

The saving in set-up time can be attributed to these Cincinnati features:



1 Internal Grinding Head. When not in use it is in the up position—out of the way for external work. Pulling it down and locking it into position for internal grinding requires but a minute or less.

1 **Hinged Internal Grinding Head**—swing it down and tighten one bolt; that's all.

2 **FILMATIC Grinding Wheel Spindle Bearings**—require no adjustment for any quality of finish or stock removal.

3 **Speed Ranger Headstock Drive**—instantaneous finger-tip selection of infinite number of speeds; A.C. motor.

4 **Standard Headstock Spindle Nose**—receives standard lathe chucks; quick change adapter available.

Other ways in which CINCINNATI 12", 14" and 18" Hydraulic Universal Grinding Machines can reduce costs in your shop are outlined in two attractive catalogs. They're yours for the asking: 12" machine, G-486-6; 14" and 18" machines, G-474-4. Brief specifications in Sweet's File for Mechanical Industries.

CINCINNATI GRINDERS INCORPORATED, Cincinnati 9, Ohio

CINCINNATI

2 FILMATIC grinding wheel spindle bearings—last for years—no maintenance.

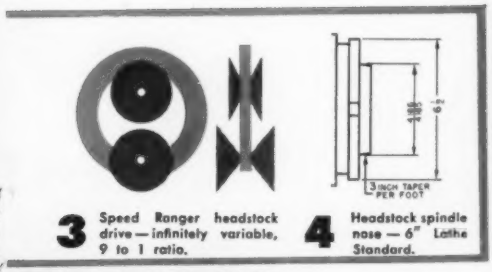
FILMATIC

CINCIN

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES

GRIND?

Variety of railroad shop parts, one to five per lot, assigned to CINCINNATI FILMATIC 14" Hydraulic Universal Grinder.



3 Speed Ranger headstock drive — infinitely variable, 9 to 1 ratio.

4 Headstock spindle nose — 6" Lathe Standard.

Internal broach, ground on a CINCINNATI FILMATIC 14" Hydraulic Universal. This operation demonstrates accuracy of sizing. The taper portion is ground by the traverse method, and then each tooth is "backed off" separately.

NATI

CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

First and

12-inch (No. 12) Involute Measuring Instrument

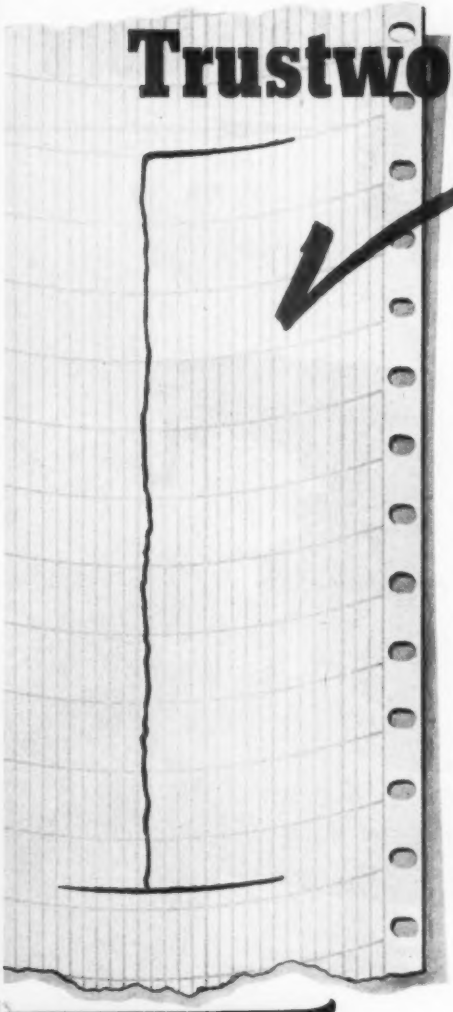
12-inch (No. 12H) Lead Measuring Instrument
a time saver also in setting up shaving machines on both spur and helical gears)

24-inch (No. 24) Involute Measuring Instrument

GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

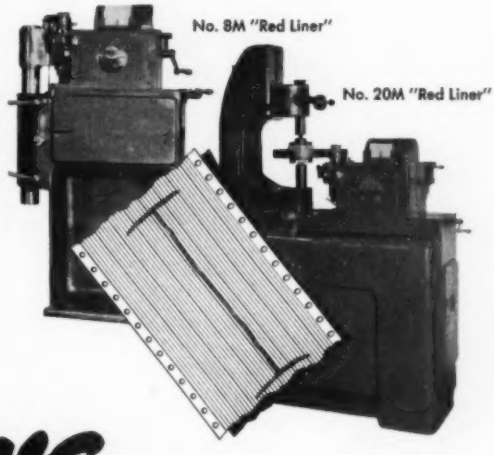
PLASTICS MOLDING MACHINES

Foremost...comes Trustworthy Inspection



That's why Fellows makes all its Gear Inspection Instruments of the precision recording type

On *tooth-form accuracy* depends smoothness of gear action... quiet operation...sustained load-carrying capacity...everything you ask of a top-quality GEAR. To fix responsibility beyond question, you will want simple, reliable, automatic-recording Inspection. Fellows builds a line of Instruments of exceedingly practical advantage. Set up procedure is of time-conserving simplicity. Mechanisms combine extreme sensitivity with protected ruggedness. Electronic recorders chart errors greatly magnified, for studied analysis and the location and amount of any departure from theoretical perfection. Call on us for descriptive literature on any of the Instruments pictured here. Each will handle external or internal gears to the capacities noted.



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THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
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The Van Norman No. 38 Miller gives you many cost-cutting advantages not found in any other miller of this type. The heavy, rugged column and sturdy ram are constructed to take all types of cuts including carbide milling. The massive cutterhead has a 10 HP motor driving the spindle, providing a 100% increase in power. Cutterhead speeds have been increased to 2000 RPM for high speed work.

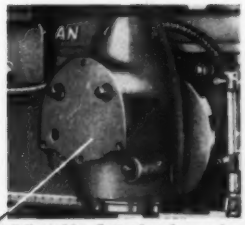
It will pay you to investigate the advantages of this New No. 38. Check its features against other millers and you'll find it gives you greater opportunities to cut costs and increase production. Write for information.

Production Work Hours . . .

VAN NORMAN No. 38

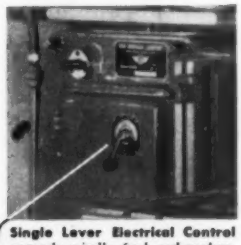
RAM TYPE MILLING MACHINE

A Heavy-Duty Miller that provides many cost-cutting advantages



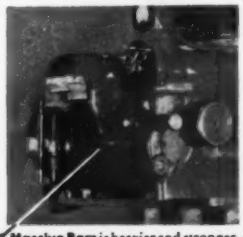
Adjustable Cutterhead permits horizontal, angular and vertical milling on *one* machine. Graduated in degrees for easy positioning.

Front and Rear Controls of all power feeds can be operated from either position. Manual controls are also at front and rear.



Single Lever Electrical Control controls spindle, feed, and coolant. The same lever reverses spindle direction.

Load Meter is right before the operator's eyes . . . gives visual indication of the "percent of load" that the machine is being operated under.



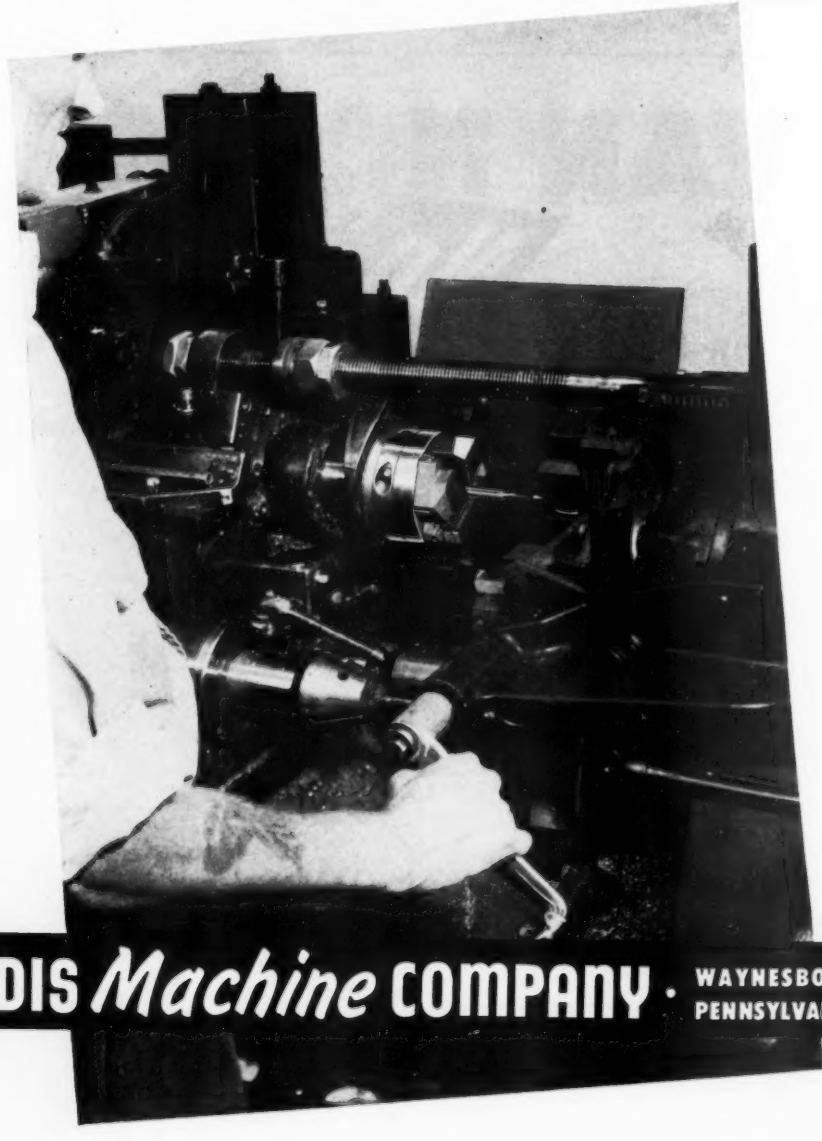
Massive Ram is heavier and stronger than on other machines. It is reinforced throughout for ruggedness and long life.

Heavy-Duty Knee Assembly, including table and saddle, is designed as an integral unit to provide maximum rigidity and accuracy.

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS

Threads Cut At Cost

LANDEX HEAD THREADS 300 PIECES



LANDIS *Machine* COMPANY · WAYNESBORO PENNSYLVANIA

Of 2/10¢ Per Piece

PER HOUR AT LOW TOOL COST ! ! !

These operations illustrate a case history of the economy and efficiency of the LANDEX Head, designed for cutting precision threads at high production rates on automatic screw machines and other "live" spindle equipment.

In this instance, ½" American Standard Pipe Threads are being generated on sprinkler frames cast of red brass. The threads are cut into a relief 3/32" wide.

The wisdom of the tool engineer in selecting LANDEX Heads for performing these threading operations is borne out by information secured from the cost sheets. Production consistently averages 300 pieces per hour, floor-to-floor time, at a total threading cost of two-tenths of a cent per piece. Tool cost was held to a minimum with 5,000 pieces being threaded between chaser grinds.

This is just one example of many successful applications of the LANDEX Head to jobs requiring high-speed thread production at an economical cost. For additional information, write for Bulletin F-90.

It Takes More Than Good Spindle Bearings for Precision Grinding Results

Fine finishes, close tolerances, fast sparkout, high output, dependable operation —all the signs of real precision grinding performance call for more than just good spindle bearings. At least, we at Landis Tool have found that true after building precision grinders for over 50 years. In Landis Tool grinders *the combination of spindle bearings and wheel spindle* produces the performance benefits so frequently claimed for the bearing alone.

If you look at spindle bearings, you will find that a number of good types are in use today. Practically all of them, if properly lubricated, will give you minimum trouble. The Landis Tool Microsphere Bearing, however, has one outstanding feature that contributes greatly to the superior performance of Landis Tool precision grinders. That feature is an extremely small running clearance between bearing and spindle. This is made possible by the combination of spindle and bearing design.

Production men understand the importance of short sparkout time to fast grinding. How many know, though, that if the bearing clearance is close, the sparkout time will be cut to a minimum, and the wheel will respond more quickly and accurately to the feed mechanism. With its close clearance, the Microsphere Bearing delivers this necessary short sparkout time.

Grinding performance also depends on the wheel spindle which the bearings support. When stock removal is heavy, you subject the spindle to bending stresses. To keep spindle deflection to a minimum, the Landis Tool wheel spindle is increased in diameter between bearings. This provides 1½ to 2 times more sectional area between bearings than at the bearings!

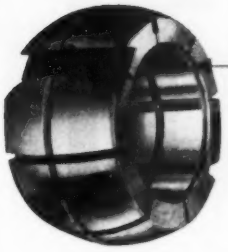
The Landis Tool extra diameter spindle provides a rigidity of spindle not found in other grinders. In terms of performance, this means a fine finish, free from spindle flutter.

The *combination* of the close operating clearance of the Microsphere Bearing and the rigidity of the increased diameter spindle delivers fine finishes, close tolerances and maximum output.

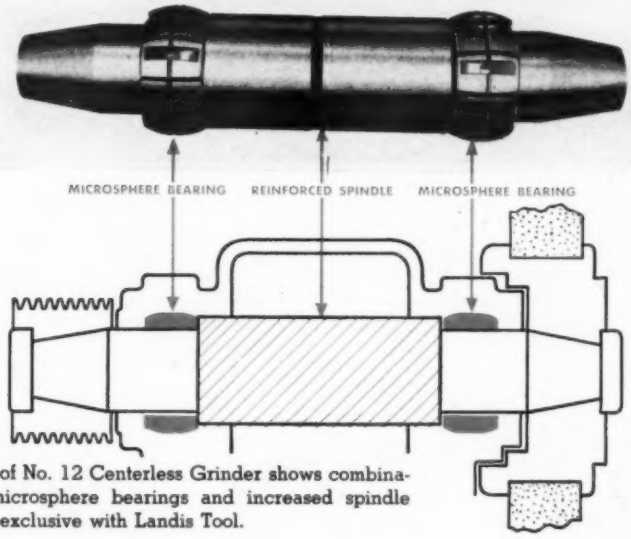
Two unusual applications illustrated on the opposite page demonstrate the importance of the Landis Tool combination of Microsphere Bearing and extra diameter spindle.

For more information on why it takes more than good spindle bearings for precision grinding results, we will be glad to send you a copy of the booklet "Microsphere Bearings."

LANDIS TOOL COMPANY, WAYNESBORO, PENNA., U.S.A.



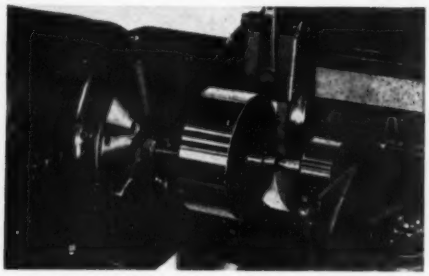
One Piece Microsphere Bearing
Steel Construction—Babbitt Lining
Used Only On Landis Tool Precision Grinders



Cutaway of No. 12 Centerless Grinder shows combination of microsphere bearings and increased spindle diameter exclusive with Landis Tool.

Unusual Applications Demonstrate Importance of Microsphere Bearing and Reinforced Spindle Construction

Two spaced wheels mounted at end of spindle with wheel base set at 30° angle.

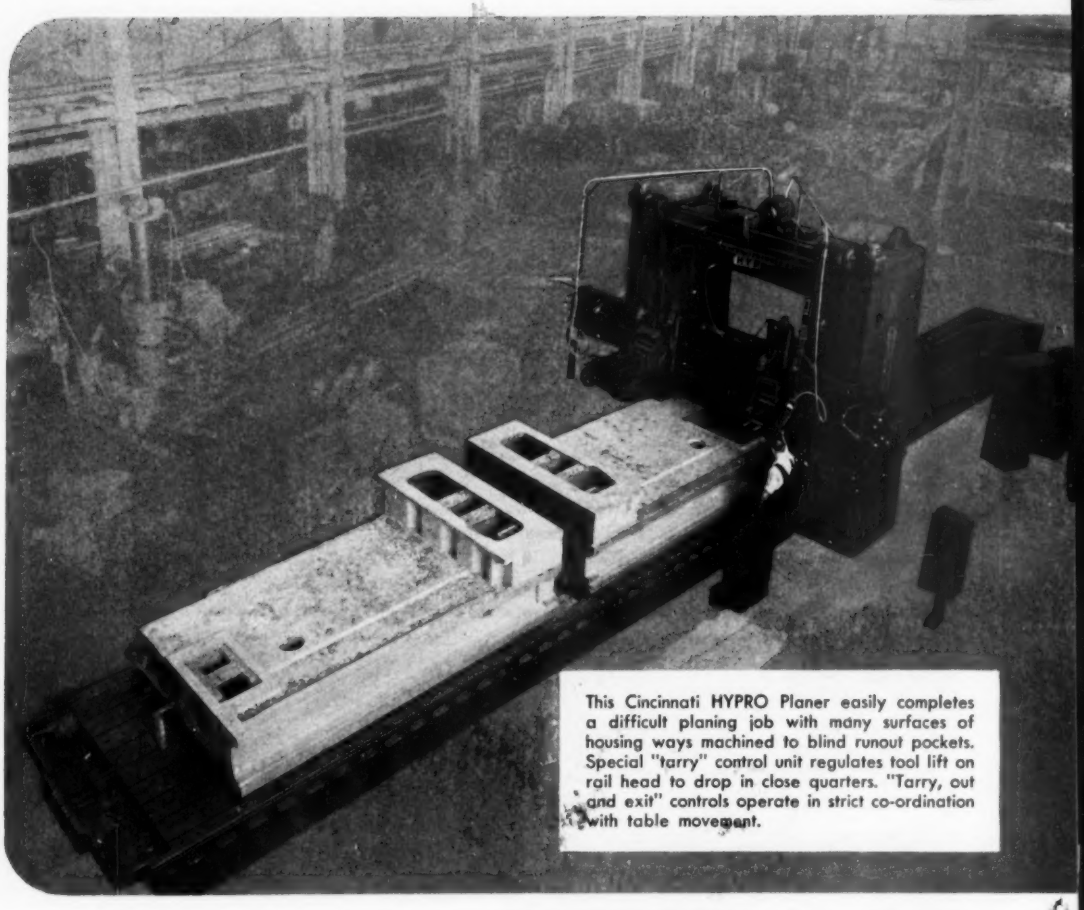


Grinding a foil finishing roll to a 2 micro-inch finish on a Landis Tool 12" Universal.

LANDIS TOOL

Precision Grinders

CINCINNATI HYPRO

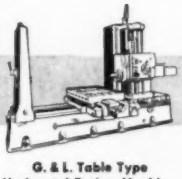


This Cincinnati HYPRO Planer easily completes a difficult planing job with many surfaces of housing ways machined to blind runout pockets. Special "tarry" control unit regulates tool lift on rail head to drop in close quarters. "Tarry, out and exit" controls operate in strict co-ordination with table movement.

GIDDINGS & LEWIS

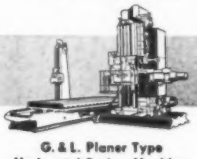
FOND DU LAC

G&L HYPRO



G. & L. Table Type Horizontal Boring Machine

G. & L. Floor Type Horizontal Boring Machine



G. & L. Planer Type Horizontal Boring Machine

Double-Housing Planer

...SIMULTANEOUSLY PRODUCES PARALLEL BEARING AND FLAT MATING SURFACES ON TWO 15-TON HOUSINGS

Mounting Castings in Tandem Speeds Overall Operations ... Matched Machining Insures Accurate Final Assembly

● The problem of machining massive castings or weldments to meet urgent production demands is solved quickly and economically with Cincinnati HYPRO Planers. Regardless of the amount of metal to be removed for rough and finish machining, ample power and rigidity are built into Cincinnati machines to perform heavy cutting operations at maximum speeds and feeds.

A typical example of HYPRO planer performance is illustrated in the machining of two 15-ton special housings. Tandem arrangement of the workpieces on the machine table speeds the overall planing operation. The two rail heads and two side heads are combined for multiple roughing cuts as required. Finish cuts are taken, using one of four heads.

Added to the time saved in the mounting method shown, the tandem arrangement insures precision alignment of bearing ways and the accurate planing of all flat surfaces. This arrangement also insures that left and right units are identically machined.

Experienced company engineers will show you how more metal can be removed faster by planing. Ask for recommendations which will increase your production.

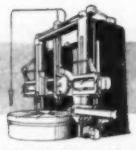
Interesting Job Facts

Part: Right and left hand special machine housings.
Material: Cast iron.
Weight: 29,875 lbs. (rough casting) each.
Machined on: 102" x 96" x 38' DH Cincinnati Planer. Machine is powered by 100 hp. adjustable voltage drive.
Type of Setup: Pair of housings in tandem.
No. of Setups: Four.
Amount of Stock Removed: ¾".
No. of Heads Used on Job: 4. Roughing—Use 2 rail heads and 1 side head. Finishing—Use only 1 head.
Speeds: 125 FPM Roughing with 300' return speed. 150 FPM Finishing with 300' return speed.
Depth and Rate of Feeds: Roughing—¾" depth at .062" feed. Finishing — .006-.008" depth at 1.000" feed.
Cutting Tools: Carbide tipped tools.
Operations: Rough ways and set up pads. Rough housing cheek and arch cheek. Finish housing cheek and arch cheek. Finish undercut and drive shaft housing pad.
Tolerances: Surfaces are planed and held to ±.001".
Machining Time: 76 hours—floor to floor.

MACHINE TOOL COMPANY

WISCONSIN, U. S. A.

Cincinnati Hypro Double Housing Planer



Cincinnati Hypro Vertical Boring and Turning Mill

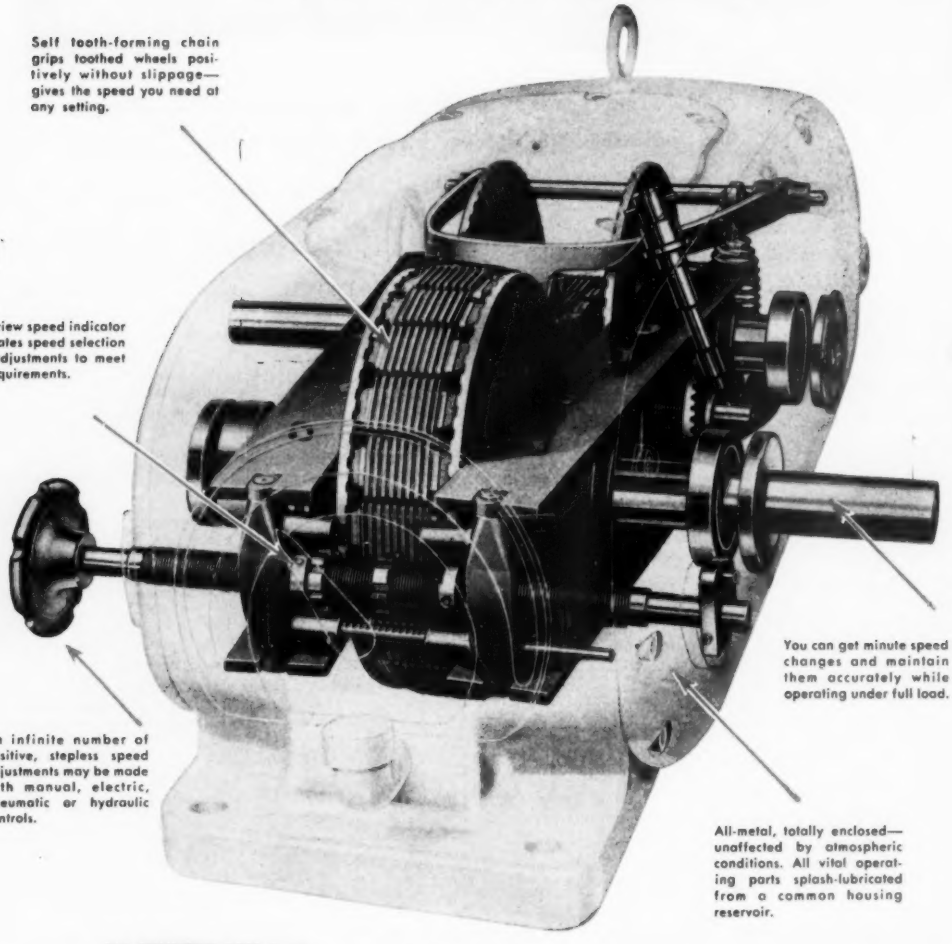
Cincinnati Hypro Planer Type Milling Machine

G. & L. Vertical Plastics Injection Press

DAVIS

Complete Tooling Service

Only the P.I.V. gives you all these advantages in a variable speed drive


Self tooth-forming chain grips toothed wheels positively without slippage—gives the speed you need at any setting.
Easy-view speed indicator facilitates speed selection and adjustments to meet all requirements.
You can get minute speed changes and maintain them accurately while operating under full load.
An infinite number of positive, stepless speed adjustments may be made with manual, electric, pneumatic or hydraulic controls.
All-metal, totally enclosed—unaffected by atmospheric conditions. All vital operating parts splash-lubricated from a common housing reservoir.

ALL INDUSTRY USES P.I.V.

Capitalize on the advantages of the P.I.V.—the only variable speed drive not dependent on friction for the transmission of power. This compact, all-metal precision unit provides the most accurate infinitely variable means for using machines to maximum capacity for the job at hand. It can be operated manually or automatically while running under full load. The Link-Belt district office nearest you is equipped to supply complete, detailed information on variable speed transmission.

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities. 12.220

P.I.V. LINK-BELT VARIABLE SPEED DRIVE

Unit Costs Reduced

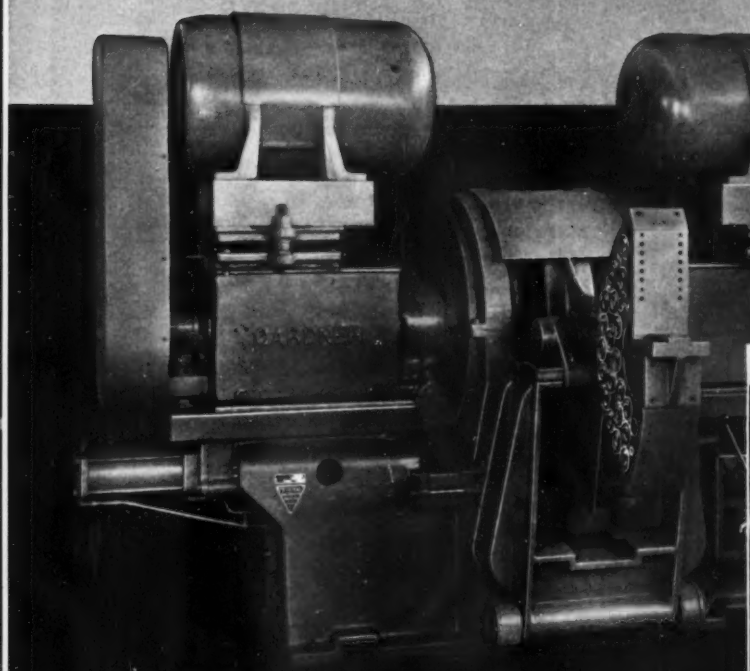
Grinding 600 Heavy

Coil Springs Per Hour

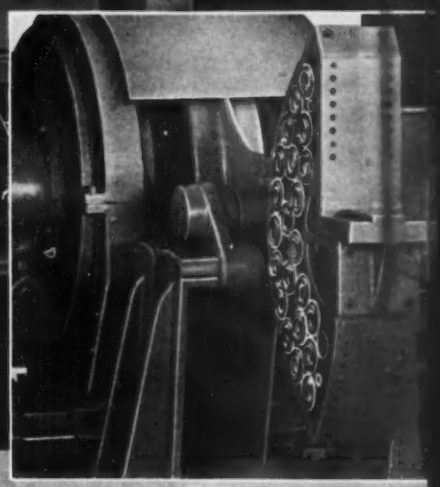
GARDNER

precision disc Grinders

TWO ends of each spring ground in ONE operation



Gardner 120A-30" Double Disc Precision Grinder. 1/8" max. stock removal grinding 2 1/2" O.D. steel springs 1/2" diameter wire. Power oscillated swinging arm work carrying fixture.



Indexing-type fixture permits operator to load and unload while grinding.

108 M

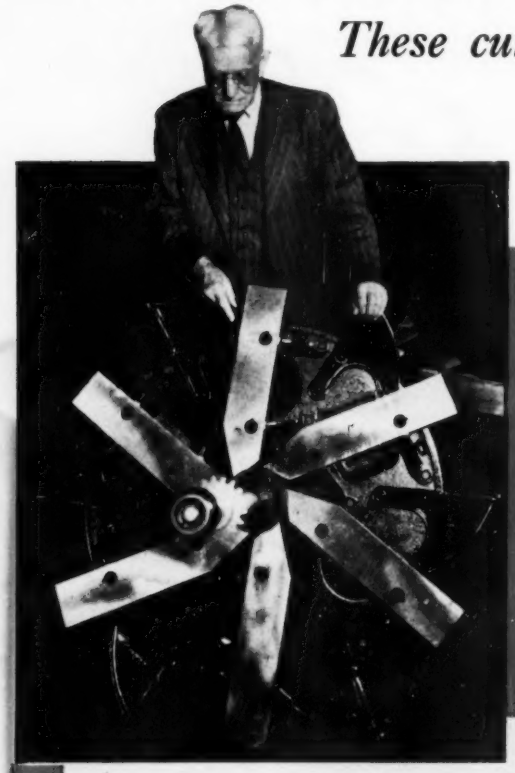
Request bulletin No. 12-7.

GARDNER MACHINE COMPANY

410 East Gardner Street • Beloit, Wisconsin, U.S.A.

Now made of U·S·S

These cutter blades are tougher,



W. H. Preston, President of Papec Machine Company, examines the sharp edge on one of the six blades mounted on the cutting wheel of a Papec machine.

Because of the uniformity of CARILLOY 4150 blades, grinding of the beveled edges can be done with a multiple set-up on this Hanchett grinder.

Stones, wood, roots and even bits of metal pass through the spinning blades of Papec forage harvesters. Now made from heat-treated CARILLOY 4150, these blades are tougher than ever — and easier and cheaper to fabricate.

Carilloy Steel...

harder—yet easier to fabricate

and cost 25% less!

SOMETIMES it costs less to use steel that costs more. Here's a case history to prove it.

Ensilage cutters and forage harvesters made by Papec Machine Company have long been regarded as tops in agricultural circles. The working heart of these machines are the cutter blades—and they really take a beating. When handling crops from stony fields, appalling amounts of stone along with wood, roots and bits of metal pass through the blades. To withstand abuse like this the blades *have* to be very tough indeed.

Papec formerly used a "laid-on" blade—a low carbon steel body with a high carbon cutting edge rolled on under high pressure and heat. These blades were good—but Papec wanted to make them better. So they called in our service metallurgist. Working closely with their engineers he finally found a way to greatly increase cutter blade durability. Now these vital parts are made of extra-tough, extra-hard *alloy* steel —heat-treated U·S·S CARILLOY 4150.

Simplified fabrication with U·S·S Carilloy 4150 cuts cost 25%

CARILLOY 4150 is plenty tough inside. Therefore it can safely take shocks that would ruin a more brittle blade. But it's also extremely hard on the surface—to furnish a sharp cutting edge that *stays* sharp. In other words, U·S·S CARILLOY 4150 provides the ideal combination of toughness and hardness that prevents damaged blades and time-wasting shutdowns.

In this application, CARILLOY 4150 does more than make a better blade—it speeds up fabrication, too. Testing it against air-hardening tool steel, Papec engineers found that, after heat-treating, CARILLOY 4150 showed all-round better characteristics and held a keen edge longer. The steel was also much more *uniform*. This uniformity paid off in two ways: First, the heat-treated CARILLOY blades were *easier* to machine. Second, the blades were less distorted after heat treatment, so *less* machining was required. As a result, the CARILLOY blades not only were much cheaper than air-hardened tool steel, but actually cost 25% less than the old "laid-on" blades.

Whatever properties your product needs—strength, toughness, light-weight, or superior durability under trying conditions — service-tested U·S·S CARILLOY Steels can provide them. And quite often at lower cost.

United States Steel Company
Room 4248, Carnegie Building
Pittsburgh 30, Pa.

☐ Please send me your book on U·S·S Carilloy Steels.

Name.....

Company.....

Address.....

City and State.....

UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA STEEL COMPANY, SAN FRANCISCO
NATIONAL TUBE COMPANY, PITTSBURGH • TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH • COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

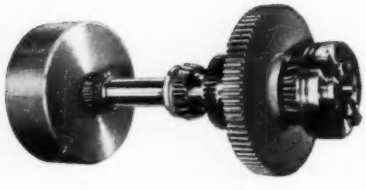
1-190

UNITED STATES STEEL

GREATER CUTTING EFFICIENCY

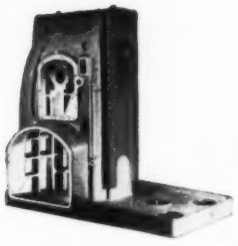
A new line of Knee-Type Milling Machines

KEARNEY & TRECKER MILWAUKEE **CK's**

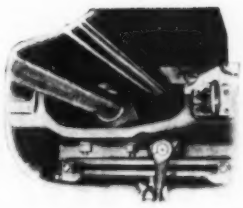


TAKE a look at the "business end" of a new CK milling machine — *the spindle* — with its dynamically balanced flywheel and Kearney & Trecker's famous extra-rigid, three-bearing spindle design. Added flywheel momentum gives you smoother, more positive cutter drive — the key to *Greater Cutting Efficiency* using modern cutting tools. Yes, and you get increased cutter life, too. The three-bearing spindle design affords ample support and greater rigidity — regardless of cutting loads. Heavy duty wide-faced spindle drive gears of forged steel are specially processed for longer life and exceptionally smooth, quiet operation. But this tremendously efficient spindle is only one of many pace-setting CK features. Look at the other features, too. See how they combine to give you the most productive, most profitable milling machines you can buy today — anywhere!

Replacement of obsolete machine tools is an



GREATER RIGIDITY — Yes, these new CK columns are the most rigid milling machine columns we've ever designed! They give you 1000 pounds more metal scientifically distributed in heavier ribbing, box section, sponson construction . . . to effectively absorb vibration from heaviest cutting loads.

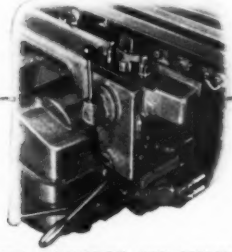


SMOOTHER FEED PERFORMANCE — with a new design 2" diam. heavy-duty, table feed screw that affords greater bearing contact and runs through an extra-long table feed nut. These new CK machines are equipped with a backlash eliminator for more effective climb milling, more accuracy and longer screw life.

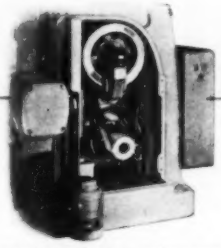
GREATER ADAPTABILITY — No. 60 Heavy Duty drive flange on Nos. 4, 5 and 6 machines enables use of heavy duty arbors with flange drive for large single or multiple cutter setups; or bolting large face-milling cutters directly to spindle nose. Average setups use standard arbors with No. 50 spindle drive.

NON-GLARE RAPID-SET DIALS—You'll avoid costly errors in reading and setting these new micrometer dials. They're vapor blasted to give you a satin surface with high contrast markings. They're easy and quick to set and provide positive lock at every setting.

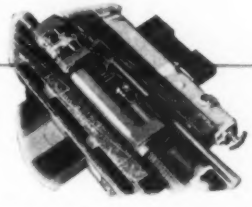
FEEDS AND SPEEDS TO TAKE FULL ADVANTAGE OF MODERN CUTTING TOOLS — and you really can do it with the broad feed and speed ranges on Kearney & Trecker's new CK milling machines. You get 24 spindle speeds (15 to 1500 rpm on Nos. 2 and 3, 13 to 1300 rpm on Nos. 4, 5 and 6) with Kearney & Trecker's automatic protecto-mesh shift to eliminate gear clashing. And there's the extra-wide feed range — 32 changes from ¾" to 90" per minute—with separate 3 or 5 hp feed and rapid traverse drive.



GREATER PRODUCTION AND GREATER OPERATING CONVENIENCE—Production men will like Mono-Lever Control because it reduces idle cutter time, shortens floor-to-floor cycle time on both long and short run lots. Operators will like it because it makes faster, simpler, less fatiguing work for them.



GREATER HORSEPOWER — where you need it. That's what you get with new CK independent motor drives for spindle and for feed and rapid traverse. Depending on machine size (Nos. 2, 3, 4, 5 or 6), machines range from 10 to 25 hp for spindle drive and 3 to 5 hp for feed and rapid traverse.



GREATER MACHINE LIFE — through automatic lubrication and generously proportioned gears and shafts throughout for overload conditions. There's a forced flood system in the column and knee, and a positive metered, pressure pump system for table, saddle and knee ways, and table feed assembly.

Kearney & Trecker's new CK line of knee-type machines is designed to meet every demand of present-day milling . . . making them more accurate, and MORE PRODUCTIVE for you. Contact your Kearney & Trecker representative or write direct to obtain their complete specifications. Find out how CK machines easily replace obsolete machines at substantial savings to you. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

investment that makes Dollars and Sense.

HOW MANY "NEW" TURRET LATHES ARE HIDDEN AWAY IN YOUR PLANT

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY . . .

The answer to that question depends upon the production you are getting out of your present machines.

And that's where your Warner & Swasey Representative comes into the picture. He, and Warner & Swasey's other 44 factory-trained field men, could give you hundreds of examples of how they have gone into plants like yours and increased the productivity of existing machine tools. It may have been a comparatively simple suggestion—a new tool, a simple adjustment, a new part. Whatever it was, it came from a man who knew what he was talking about—a man who is willing and eager to help you get the maximum amount of production out of your present machine tools.

For today, as never before, you need *production.* We consider it our responsibility to help you get the maximum production out of your present turret lathes.

WARNER & SWASEY

MACHINE TOOLS — CLEVELAND, OHIO

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, AND TAPPING MACHINES

"Each to his

. . . that's how

MORSE TAPS

are Individually Engineered for Top Performance and Longer Life

So your tapping job is *different?* That's fine! Morse makes . . . or will make as "specials" . . . the tap to do it fastest, to produce smoothest, strongest threads over the longest period, to deliver more and cleaner cutting for your tap dollar. And to get *even more* for your money, specify Morse Electrolized Taps.

For like every good worker, every Morse Tap is specially qualified for its job . . . has had long and successful experience at it. What's more, every Morse Tap is a *precision* tool. Morse produces only one quality: *the highest obtainable.*

This single-standard MORSE QUALITY is obtainable *only* from your Morse-Franchised Distributor. So get together all your tapping troubles, and see him today.

MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASS. *(Div. of VAN NORMAN CO.)*

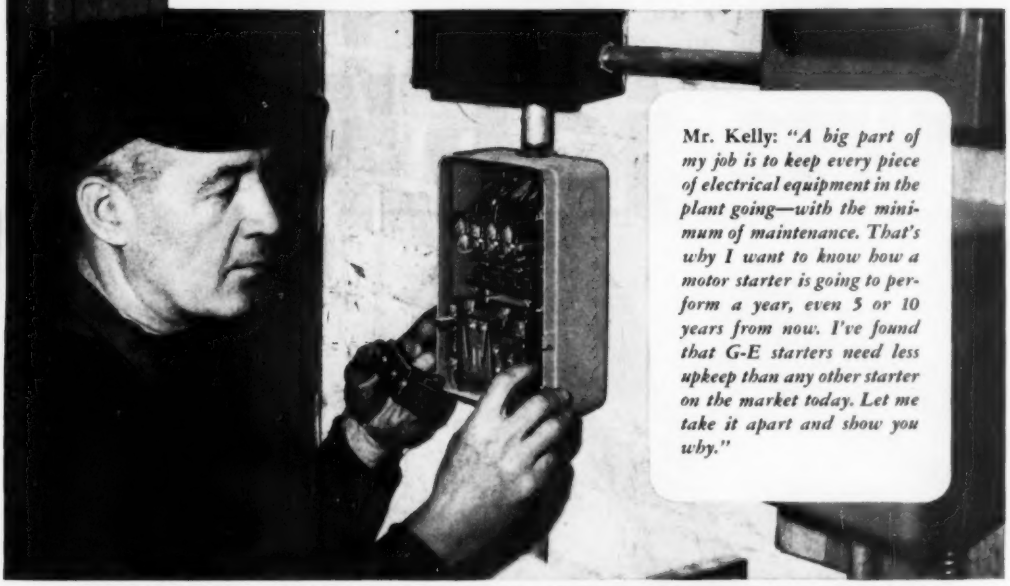
Warehouses in New York, Chicago, Detroit, San Francisco

MORSE

Cutting Tools

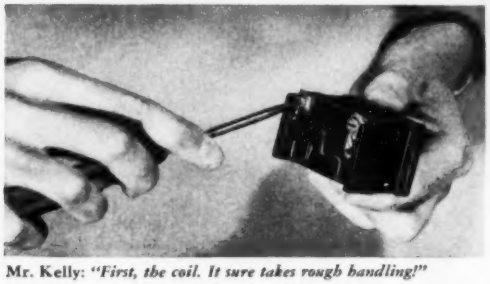
MOTOR STARTERS ...need less

MARTIN KELLY, PLANT-



Mr. Kelly: *"A big part of my job is to keep every piece of electrical equipment in the plant going—with the minimum of maintenance. That's why I want to know how a motor starter is going to perform a year, even 5 or 10 years from now. I've found that G-E starters need less upkeep than any other starter on the market today. Let me take it apart and show you why."*

Martin Kelly, Plant Electrician for John R. Evans & Co., changes an overload relay on G-E combination starter quickly and easily.



Mr. Kelly: *"First, the coil. It sure takes rough handling!"*

1 Right you are, Mr. Kelly. We call it the "Strongbox Magnet Coil." That block of plastic keeps the windings permanently protected against dirt, moisture, and oil. And if your screwdriver slips, it can't damage the windings.

Mr. Kelly: *"I've seen no sign at all that these contacts are burning or pitting."*

2 That's because they have fine silver tips that outlast by far the ordinary type contact. Even where it's a "start-stop" job with dozens of operations each minute, they'll stand the gaff.

GENERAL ELECTRIC

730-20

upkeep for 4 big reasons!

ELECTRICIAN, SHOWS WHY—WITH THE "SCREWDRIVER TEST"

Mr. Kelly: *"There doesn't seem to be any wear on the moving parts."*

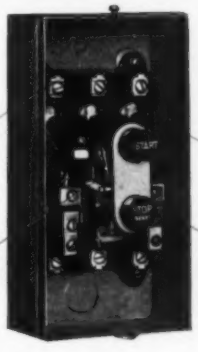
3 That's right. The moving structure is rugged and basically simple. There's no metal-to-metal friction between magnet and coil; thus, little or no wear. And the "molded-in" lubricant in the coil keeps the magnet operating smoothly and quietly for life.

Mr. Kelly: *"Overload protection means a lot; I certainly don't want any burned-out motors these days."*

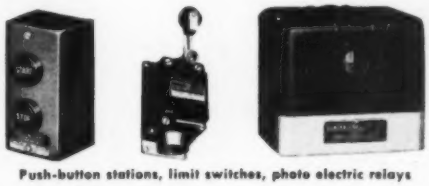
4 Those overload relays will give your motors all the protection they'll ever need. They are reliable and never need any attention. Heaters are in front and can easily be changed without disturbing any wiring.

MANUAL STARTERS, TOO . . .

For infrequent starting of 7½ hp or smaller motors, you can't beat a G-E manual starter for economy and dependable operation. . . Built to the same rugged specifications as the magnetic starter, it includes many of the same features for long life and easy upkeep.


Front-connected clamp-type terminals, and plenty of wiring space.
Fine silver contacts long outlast ordinary contacts
Sturdy, vibration-resistant, snap-action switch mechanism
Bimetallic overload protection with heaters readily accessible

A complete line of control accessories . . .



Push-button stations, limit switches, photo electric relays

. . . and many others can make operations more automatic, more convenient.

BUY ONE AND COMPARE! Disassemble a G-E motor starter, magnetic or manual, and inspect it. See for yourself why G-E starters last longer, cost less to install, and are easier to maintain than any starters you can buy. Your G-E representative or authorized distributor can supply many models of G-E starters in NEMA sizes 0, 1, 2, and 3 for motors up to 50 hp; anticipate your requirements and place your order early. For more information on magnetic starters, write for Bulletin GEA-5153; manual starters, Bulletin GEA-1522. *Section 730-20, Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

Need an "Information Center" in your plant?...

...Get it with VEEDER-ROOT COUNTERS

Every production machine *you use* can be made to "report to headquarters" . . . by flashing figures a few feet or many miles to Veeder-Root Magnetic Counters group-mounted on a central board.

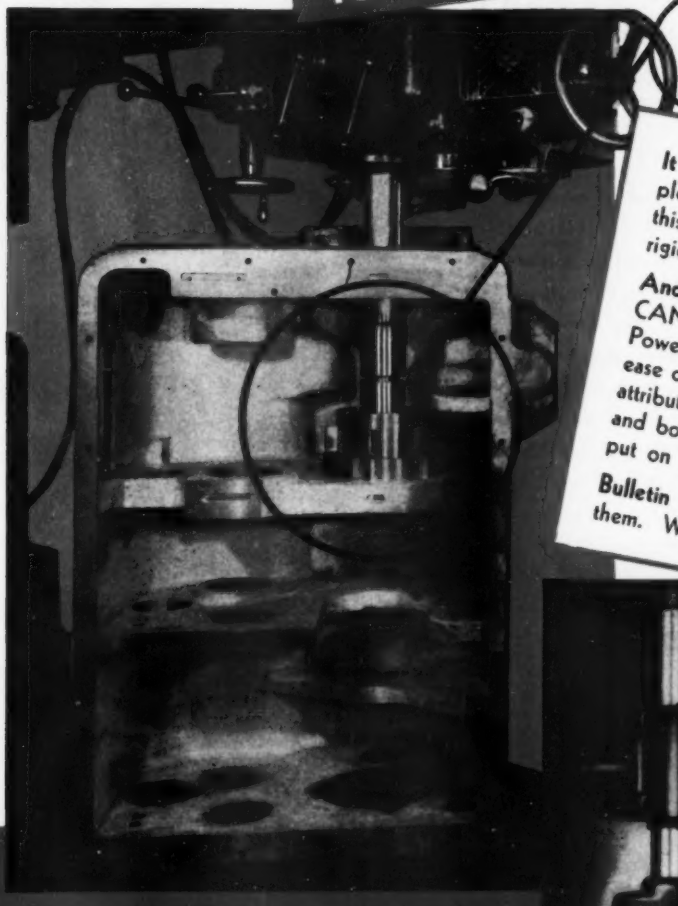
And every machine or product *you make* can be made to *count for more...* both for you and your customers...by Veeder-Root Counters built-in as original equipment. Find out how. *Write:*

VEEDER-ROOT INCORPORATED
HARTFORD 2, CONNECTICUT

Montreal, Canada • Dundee, Scotland • Offices and Agents in Principal Cities

A GOOD SPINDLE

FOR GOOD BORING AND TAPPING . . .

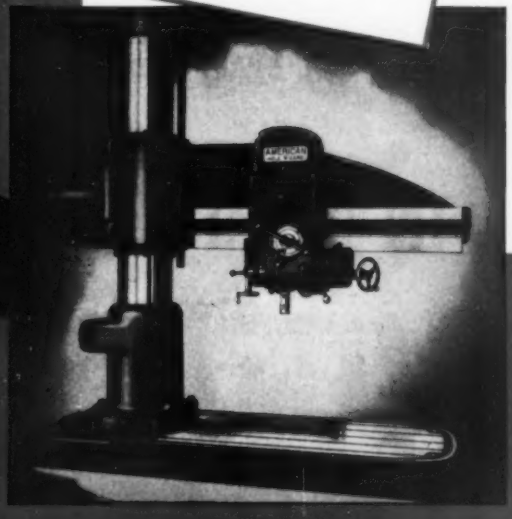


Here's a 10" tapping job on a 5-foot "AMERICAN" Hole Wizard Radial

It takes a sturdy, rigid machine with plenty of power to do work like this. Especially does it require a rigid and smooth-acting spindle.

And that's exactly what "AMERICAN" Hole Wizards are noted for. Power—rigidity—convenience and ease of control are "AMERICAN" attributes that cut drilling, tapping and boring costs wherever they are put on the job.

Bulletin No. 327 tells all about them. Want one?



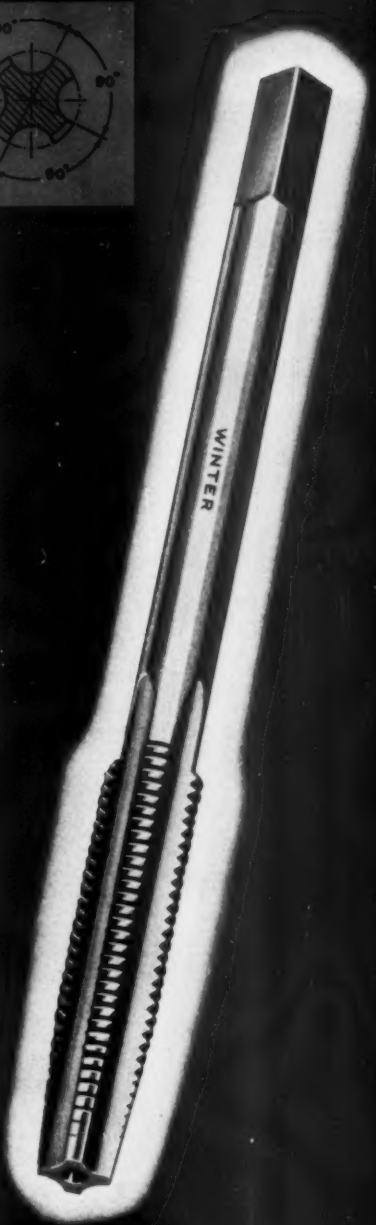
THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

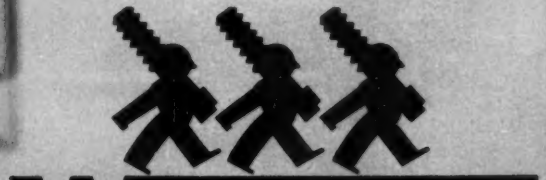
QUALITIES OF CRAFTSMANSHIP IN WINTER NUT TAPS

Exact Flute Spacing

Among the many mechanical and technical advances incorporated in Winter "Balanced Action" Taps, exact flute spacing is an important element. The spacing is made from index plates of the highest accuracy. Furthermore, once this is accomplished special care is taken to see that the spacing is accurately held throughout subsequent manufacturing steps. Exact flute spacing is an engineered inbuilt feature of Winter Nut Taps, and indeed of the complete Winter "Balanced Action" line. Other Winter Taps available include chip driver, hand, machine screw, pipe, pulley, and tapper taps.



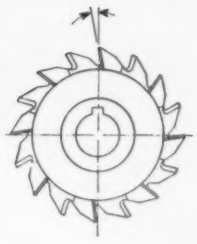
ALWAYS AT YOUR SERVICE—YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.



WINTER

WINTER BROTHERS COMPANY • Division of the National Twist Drill and Tool Company, Rochester, Michigan, U.S.A. Distributors in Principal Cities • Branches in New York, Detroit, Chicago, San Francisco

POINTS OF SUPERIORITY IN NATIONAL MILLING CUTTERS



Correct Rake Angle

Milling cutters having proper rake work more efficiently and have a longer life between grinds. A large rake angle (10° to 20°) works well in soft, ductile materials and for deep cuts. For hard, brittle materials and for shallow cuts, a smaller rake angle (0° to 10°) is desirable. For all around work a rake of 10° to 15°—usually 12½°—is best. Milling cutters are part of National's complete line of rotary metal cutting tools, which also includes twist drills, reamers, counterbores, and mills, hobs, and special tools.

"CALL YOUR DISTRIBUTOR"—It is NATIONAL'S firm belief, based on long experience, that the local industrial distributor is the one best source for all staple industrial needs—including NATIONAL Metal Cutting Tools.

NATIONAL TWIST DRILL & TOOL CO. ROCHESTER MICH. U.S.

National

NATIONAL TWIST DRILL AND TOOL COMPANY • Rochester, Michigan, U.S.A. Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

Why Not Gear Up For Today's Production *This Way?*

For 11 years this Stentor blanking die and punch gave trouble-free performance, averaging 100,000 gears per grind. This record enabled management and production to avoid production delays by keeping machines operating with fewer shut-downs for resharpening. The precision gears, 120 teeth/90 pitch, are made from 24 ga., ¾-hard brass. In heat treatment the die moved only .0005" on the maximum diameter of the gear.

It wasn't a happy coincidence that the tool and die steel was perfectly suited to put production from the tools on a smooth, trouble-free basis. It was planned that way—with the help of the Carpenter Matched Set Method. For the Method not only enabled this plant to eliminate costly experimentation in selecting the right steel, but enabled management to forecast output in advance because they could count on the tools to produce the parts *on time*.

Used in hundreds of plants, the Method offers far more than simplified tool steel selection. It makes machine operators more productive. It enables your plant to carry lower tool steel inventories. It makes heat treating easier, simplifies tool-room and production procedures. What's more, it is amazingly easy to apply. No extra cost or bother. To discover what it can do for you, ask for the new booklet "How to Get Better Tool and Die Performance". THE CARPENTER STEEL CO., 109 W. Bern St., Reading, Pa.

Export Department: The Carpenter Steel Co., Reading, Pa. "CARSTEELCO"

Carpenter

MATCHED TOOL & DIE STEELS

More than top-grade steels . . . a Method to keep tooling and production on schedule!

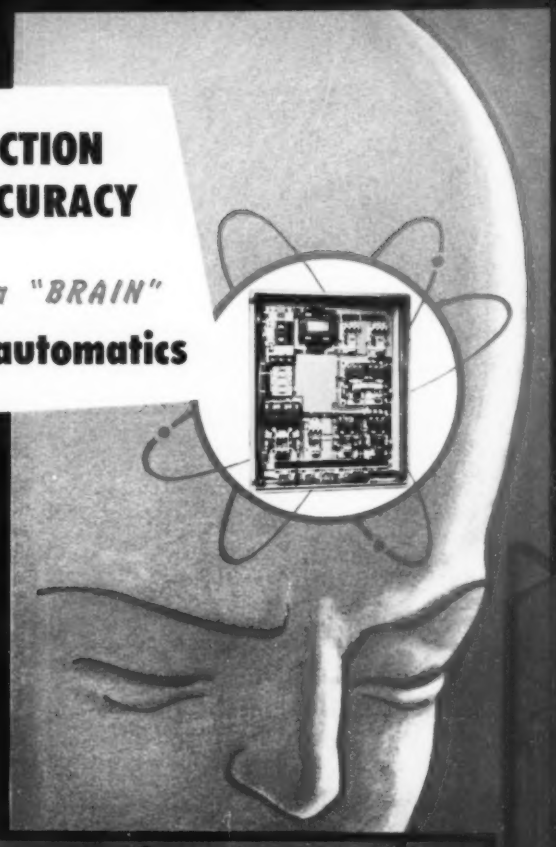
For your convenience, Carpenter carries warehouse stocks in principal cities throughout the country.

If you want GREATER PRODUCTION with CONTROLLED ACCURACY

Then you'll want . . .

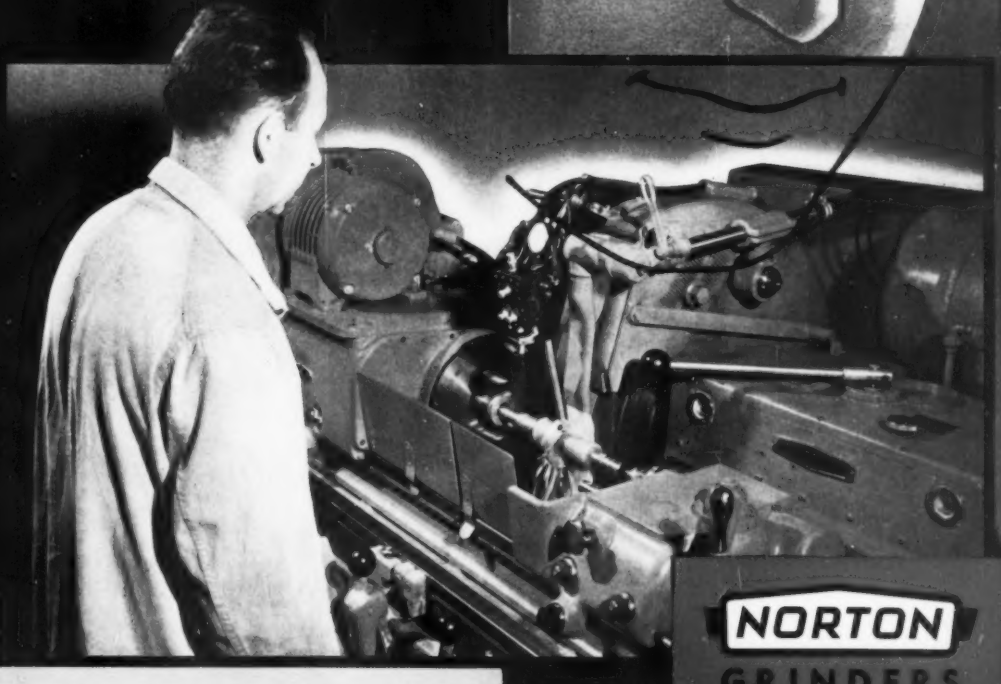
the cylindrical grinders with a "BRAIN"

the NORTON 6"and 10" Semiautomatics



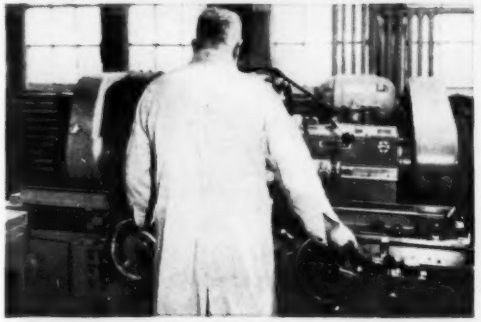
These Type CTU Machines
Give You Better Performance
Three Ways . . .

- Easier Operation
- More Uniform Sizing
- Less Maintenance



NORTON
GRINDERS

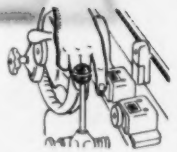
EASE OF OPERATION



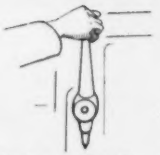
All controls are located conveniently within reach of operator's hands. Controls work as easily as a push-button radio.

NORTON

Operaters like the ease-of-operation features of these machines which perform many feeding and control functions automatically.



Feed Rate Controls are all situated at front of machine for convenient setting.



Proper Truing and **Grinding Speeds** can be pre-set with first piece on job. Lever movement brings one or the other thereafter.

Feather Touch Work Jogging Lever permits work to be jogged at any time whether work rotation is automatically governed or not.

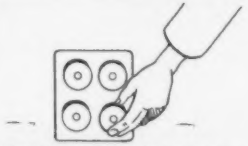
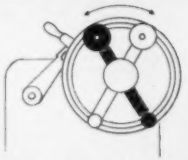
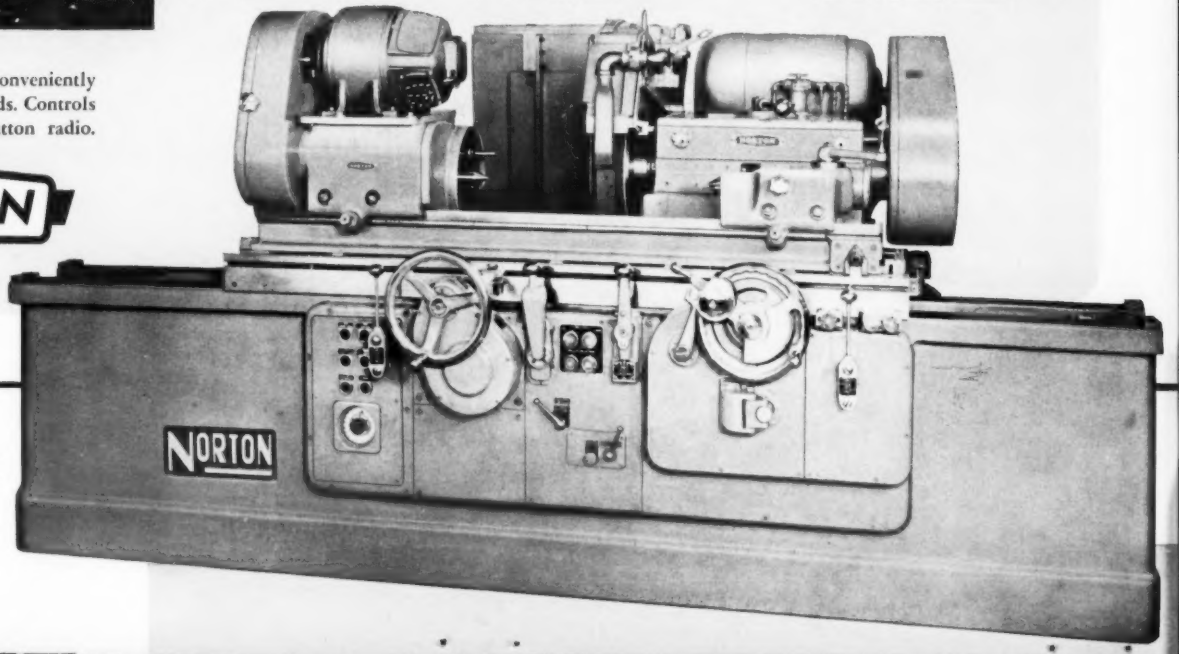


Table Dwell Controls, both right and left, are adjustable seperately and located hand-high directly in front of operating position.



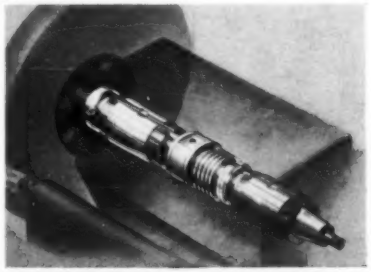
Automatic Wheel Feed occurs with each table reversal — with automatic re-set after grinding to size.



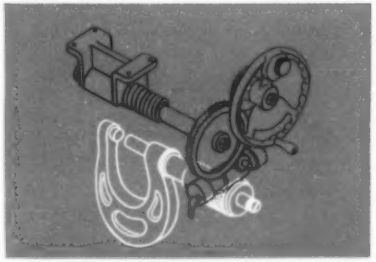
The Norton 10" Type CTU Semi-automatic is built in length capacities from 18" to 120" — and designed for production grinding.

CONTROLLED ACCURACY UNIFORM SIZING

Inspection Time is cut and costs thereby reduced because of the uniform sizing performance of NORTON cylindrical grinders.



Important To Precision is the Norton wheel spindle unit supported in two super-duty size, hard bronze bearings. The spindle stays on its fixed center-line. Flood lubrication is automatic, filtered, self-contained within wheel slide.



Complete Metal-to-Metal Contact during grinding feed portion of cycle — another assurance of prolonged accuracy — is provided by the Norton Micrometric Revolving Feed Screw Mechanism.

Ask the Men who Know the Norton Type CTU Machines

Management men and operators alike will tell you why they like these cylindrical grinders with a "BRAIN"

- "Outperforms earlier makes" - - - "Inspection time reduced by uniform sizing performance" - - - "an average increase of 31% with CTU's over previous cylindrical grinders" - - - *says management*
- "Easier to handle" - - - "Like a push-button radio" - - - "Really holds size" - - - "Eliminates worry of work spoilage" - - - *say the operators.*

You can attain high output in production grinding with the Norton Type CTU Machines. Many feeding and control functions are performed automatically. This permits the operator to devote much of his attention to loading and unloading. (Under some conditions it may permit him to attend two machines.)

The speed with which both the 6" and the 10" Semiautomatics turn out work with fine repetitive accuracy will save time in your inspection department. The percentage of rejections will be significantly reduced.

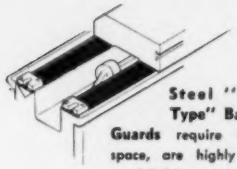
Important savings in time are gained from the ease-of-maintenance features. There is maximum accessibility to electrical controls and to hinged guard for wheel change. Sludge can be removed quickly. Pumps and motors are positioned for easy servicing.

For more complete information on these high output, precision grinders write for **Catalog** *1488 describing the 6" machine or* **Catalog** *1788 covering the 10" cylindrical grinder.*

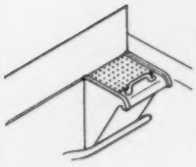
GRINDERS ...To Economize-MODERNIZE with a New NORTON... LAPPERS

NORTON COMPANY, WORCESTER 6, MASS.

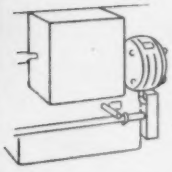
Ease of Maintenance . . .



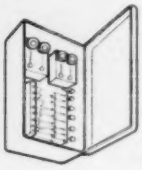
Steel "Ribbon Type" Base Way Guards require no floor space, are highly efficient at minimizing grit infiltration.



Clean-out Ramp cast into rear base for rapid, easy sludge removal — greatly reduces clean-out time.



Pumps and Motors mounted outside base, knee-high, for convenient servicing.



Elevated Electrical Control Enclosure keeps controls away from floor level dust and dirt.

Maximum accessibility to electrical controls is achieved by positioning the control enclosure at arm height for easy servicing in standing position.

You Can Also Speed Production with these Four Norton Machines

The No. 20 Cutter and Tool Grinder
The highly versatile, **tilting wheel head** machine for general tool room service. Catalog No. 189-2 for details.

The 10 x 20" Universal Grinder
The wide range universal machine with a 1" **clear-through hole** in head-stock spindle. Catalog No. 170-2 for details.

The 8" Hydraulic Surface Grinder
At home in tool room or production line. **Continuous hydraulic cross feed** a real feature for truing. Catalog No. 190-2 for details.

The Type 16 FC Lapping Machine
The vertical lapping machine that produces optically flat surfaces and thickness tolerances **in millionths.** Catalog No. 212-2 for details.

GRINDERS **NORTON** LAPPERS

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASS.

New York • Detroit • Chicago • Cleveland • Hartford

Distributors in All Principal Cities

CTU Bulletin No. 1-351

Printed in United States of America

ABRASIVES - GRINDING WHEELS - GRINDING AND LAPPING MACHINES - REFRACTORIES - POROUS MEDIUMS - NON-SLIP FLOORS - BORON CARBIDE PRODUCTS - LABELING MACHINES - CAPSULATING MACHINES

It takes a tough, rugged KING

(Right) 72" KING Vertical Boring & Turning Machine at Caterpillar Tractor Co., Peoria, Illinois. Piece being machined is a side shift rack for "Caterpillar" No. 12 Motor Grader.

(Below) "Caterpillar" DW 20 4-wheel Diesel Tractor with W20 Wagon. This new high-speed, long-haul, high-capacity, earth-moving combination is the result of five years of intensive research and development. Sturdy parts for both units are precision machined in record time on "Caterpillar's" big, husky KING.

to build *mountain-moving "Cats"!*

WRITE FOR NEW CATALOGS

New illustrated KING catalogs give detailed description of machines and complete specifications. Catalog K-1 features machines sizes 30", 36" and 42"; K-2, sizes 52", 62" and 72"; K-3, sizes 84" and 100"; K-4, sizes 120" and 144".

Men who design and manufacture tough, big-muscled "Caterpillar" products require the same qualities of rugged power and stamina in the machine tools that build them. This 72" New-Series KING has the power, rigidity and range of speeds that make it ideally suited to "Caterpillar's" production requirements.

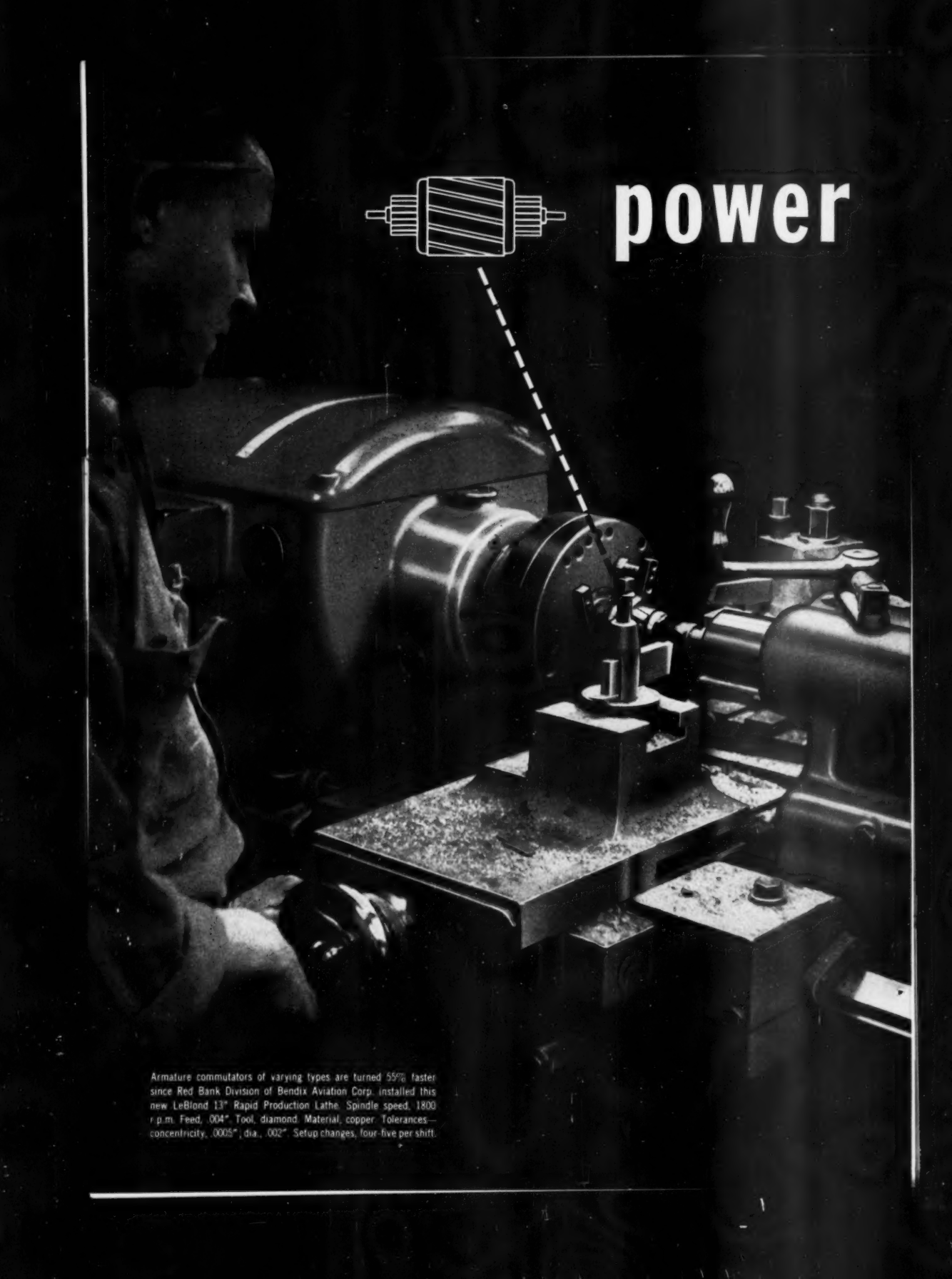
Here, as in other leading industries, New-Series KING Vertical Boring & Turning Machines are consistently proving their ability to cut costs and improve quality on the complete range of boring, facing, and turning work. Investigate KING's cost-cutting advantages. Ten sizes–30" to 144"—the *widest* size range in the field.

American Steel Foundries

KING MACHINE TOOL DIVISION

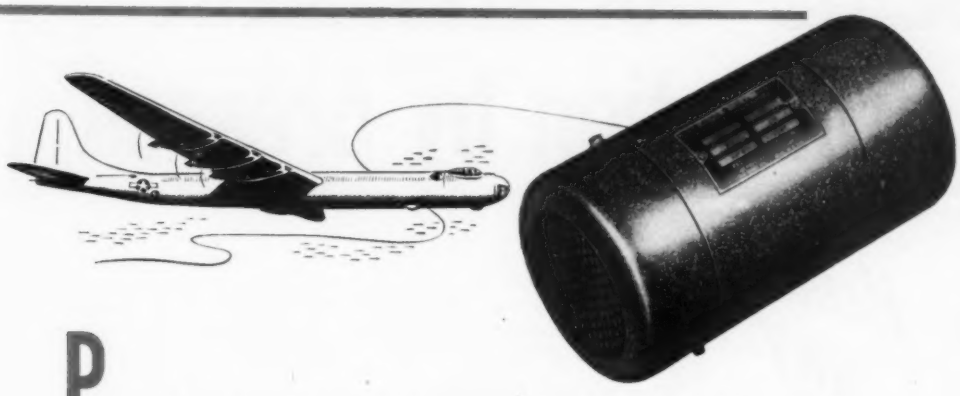
CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes



Armature commutators of varying types are turned 55% faster since Red Bank Division of Bendix Aviation Corp. installed this new LeBlond 13" Rapid Production Lathe. Spindle speed, 1800 r.p.m. Feed, .004". Tool, diamond. Material, copper. Tolerances—concentricity, .0005"; dia., .002". Setup changes, four-five per shift.

for an airplane's eyes and ears



Power for vital radar and communications equipment in airplanes is supplied by dynamotors like this. They're made in dozens of types and sizes to provide precise, unfailing power for the variety of electronic accessories used in modern aircraft.

Heart of the dynamotor is the armature. Its commutators require turning to high degrees of finish and accuracy for dependability under all flight conditions. For this job Red Bank Division of Bendix Aviation Corp. needed a precision production lathe, versatile enough to handle the entire range of sizes without costly setups. They installed a new LeBlond 13" Rapid Production Lathe . . . recommended by the LeBlond New York Office. Result? *Production increased 55%.*

This LeBlond Lathe makes possible high-production turning of a *variety* of work within the range *you* choose. It offers your choice of two geared and one motor headstock with various speed combinations from 68 to 3600 r.p.m., feeds from .001" to .064". A score of attachments is available.

Whether you turn tiny armatures or tenton shafts, there's a LeBlond Lathe to turn them faster, better. Your nearby LeBlond Distributor will tell you about the 13" Rapid Production and other late models. Call him or write . . .

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin RP-201 A for more information on the 13" Rapid Production Lathe.

turned faster by

LeBLOND
of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 63 YEARS

BLISS—for armament production by presses

HERE'S WHY...

If you plan to produce small arms ammunition, artillery cases, projectiles, military vehicles, aircraft parts, fuses, chemical containers or any one of thousands of pressed metal components for ordnance materiel—Bliss is the company best qualified to recommend both the equipment and methods. For Bliss designed and built more pressed metal machinery than any other company during World War II. It's logical to call on Bliss because:

Bliss has the engineering experience—over 90 years of it—and the manufacturing capacity—four plants—*to equip complete projects.* Bliss builds more types and sizes of presses than any other company in the world.

Bliss is skilled in all phases of press design—mechanical and hydraulic—for the drawing and extrusion of steel, copper and brass...for light metals and powdered metals.

Bliss builds the full range of automatic feeding, indexing and ejecting devices to obtain the maximum press output.

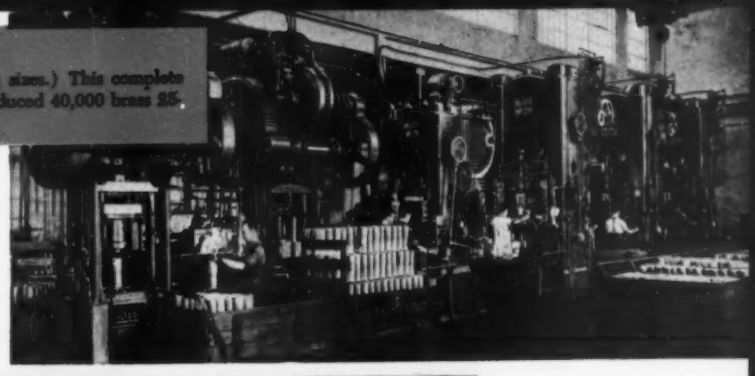
Whether it's a single press for a given job or a complete stamping plant, Bliss engineers welcome your inquiry. They will help you determine methods, production rates and costs without obligation.

E. W. BLISS COMPANY, CANTON, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

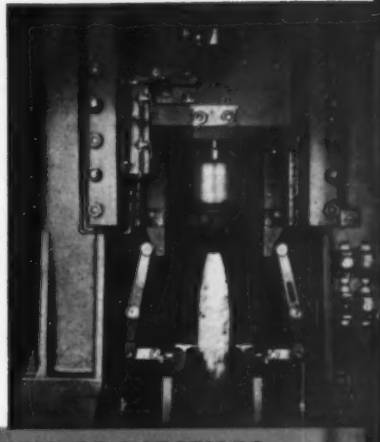
SMALL ARMS AMMUNITION

Bliss produced over 8,000 presses and special machines for all types of small arms manufacture in World War II.



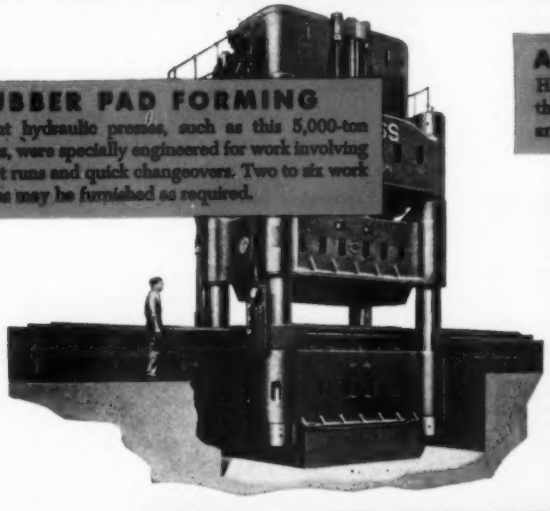
ARTILLERY CASES
(Mechanical Lines for the medium sizes.) This complete line of Bliss mechanical presses produced 40,000 brass 25-pounder cases a week.

ARTILLERY CASES
(Hydraulic Lines for the larger cases.) Quick advance, constant-draw speed and quick-return features speed production. Tall draw presses in background have 108" stroke. Heading and tapering presses are beyond them.



ARTILLERY PROJECTILES
Hot forged by the older methods or cold extruded by the new methods, Bliss hydraulic or mechanical presses are available for the light, medium or the heavy lines.

RUBBER PAD FORMING
Giant hydraulic presses, such as this 5,000-ton press, were specially engineered for work involving short runs and quick changeovers. Two to six work slides may be furnished as required.



ELECTRICAL COMPONENTS
Hundreds of high production presses for motor laminations and ordnance parts like percussion caps, fuse plates, links, cartridge clips, were built by Bliss in World War II.

Sweet's File for the Mechanical Industries

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marking i
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partitions, fences and guards d

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power generation a
water conditioning b
air conditioning and refrigeration c
lighting d

7
service equipment, special services
service equipment a
special services b

looking for machine tools?

A TIP ON FILING LOOSE CATALOGS. A good filing system must be a good finding system. Research and experience in making manufacturers' catalogs quickly and easily accessible have resulted in the improved classification systems now used in the various Sweet's Files. You may wish to use the classification system illustrated here for filing, and easily finding, individually received catalogs, specification sheets, detail drawings, technical articles, etc. In this way, too, ideal coordination can be achieved between file drawer and the catalogs pre-filed in your Sweet's File for the Mechanical Industries.

reach for Sweet's **. . . all these manufacturers' catalogs — containing comprehensive information on machine tools, attachments and accessories—are instantly available in Section 1 of your Sweet's File for the Mechanical Industries.**

The other sections of this Sweet's File contain additional manufacturers' catalogs covering a wide range of materials and equipment. You will find useful and up-to-date information on product forms, characteristics, performance and use.

This grouping of manufacturers' catalogs, in sections according to products or use of products, is made for your convenience, so that you can more readily compare one product with another. Indexes of manufacturers, products and trade names lead you quickly and easily to the catalogs you are looking for.

Sweet's is working constantly to get more manufacturers to send you their catalogs in this easy-to-use form. If you fail to find what you want in your Sweet's File, please tell us.

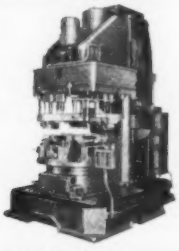
Sweet's catalog service

DIVISION OF F. W. DODGE CORPORATION

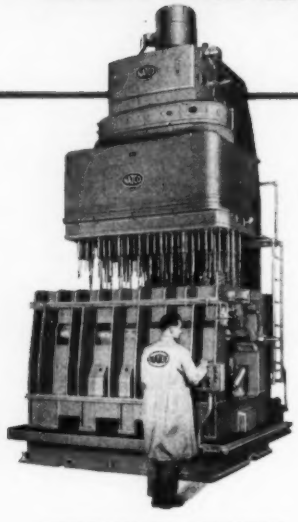
119 WEST 40th STREET NEW YORK 18, N. Y.

50 Years Experience

NATCO LIGHT SENSITIVE DRILLER AND TAPPER



NATCO HOLESTEEL ADJUSTABLE DRILLER AND TAPPER



NATCO HEAVY DUTY HOLESTEEL DRILLER

NATCO STATION TYPE MACHINE

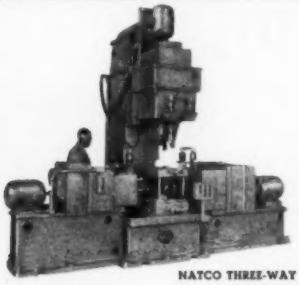
Out of the past fifty years of NATCO experience has come a deeper understanding of today's engineering and production problems. By reason of this maturity of understanding the NATCO organization is better equipped to help you solve your drilling, boring, tapping and facing problems. Better equipped with experienced engineers and designers. Better equipped with the most complete range of adjustable and fixed center multi-spindle machines in the world.

A few of the various NATCO machines are illustrated above. As you can see they range from small, fast, light-sensitive multi-drillers and tappers to large automatic processing machines . . . from single spindle to an unlimited number of spindles, from one direction to any number of directions, vertical, horizontal or angular, special or standard and operations range from 1/16" drill to 14" or larger bore. The materials worked include iron, steel, bronze, aluminum, wood and plastic.

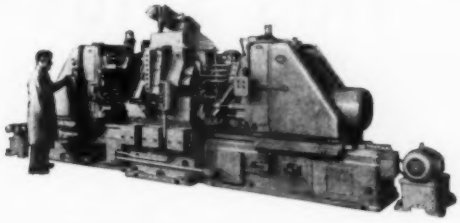
NATCO HIGH SPEED SENSITIVE DRILLER AND TAPPER

NATCO HIGH SPEED SENSITIVE UNIT

NATCO ONE-WAY TURNING BORING AND FACING MACHINE



NATCO THREE-WAY TAPPER WITH INDIVIDUAL LEAD SCREW



NATCO THREE-WAY TRUNNION TYPE DRILLING MACHINE

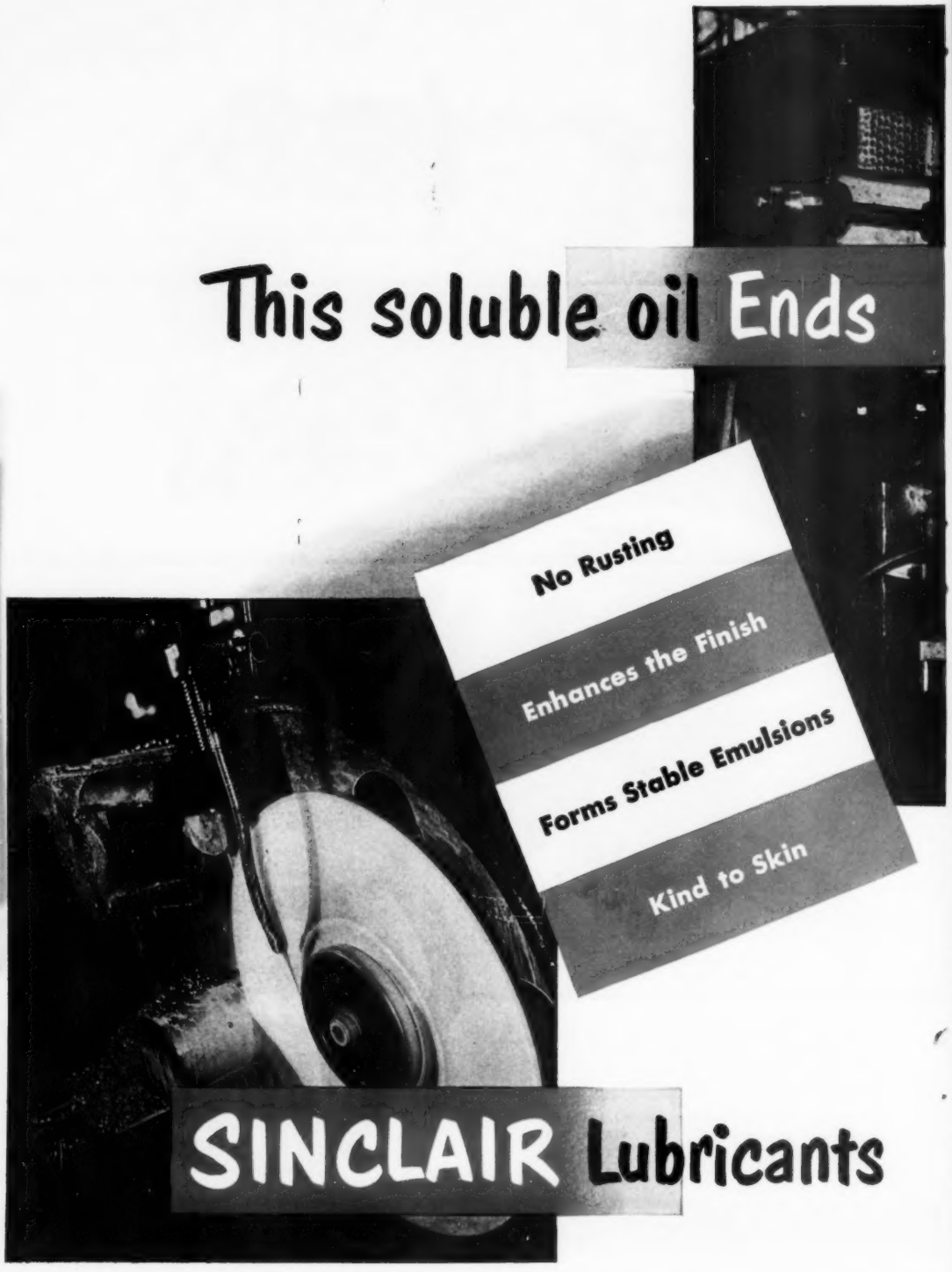
NATCO HOLEWAY AUTOMATIC PROCESSING MACHINE

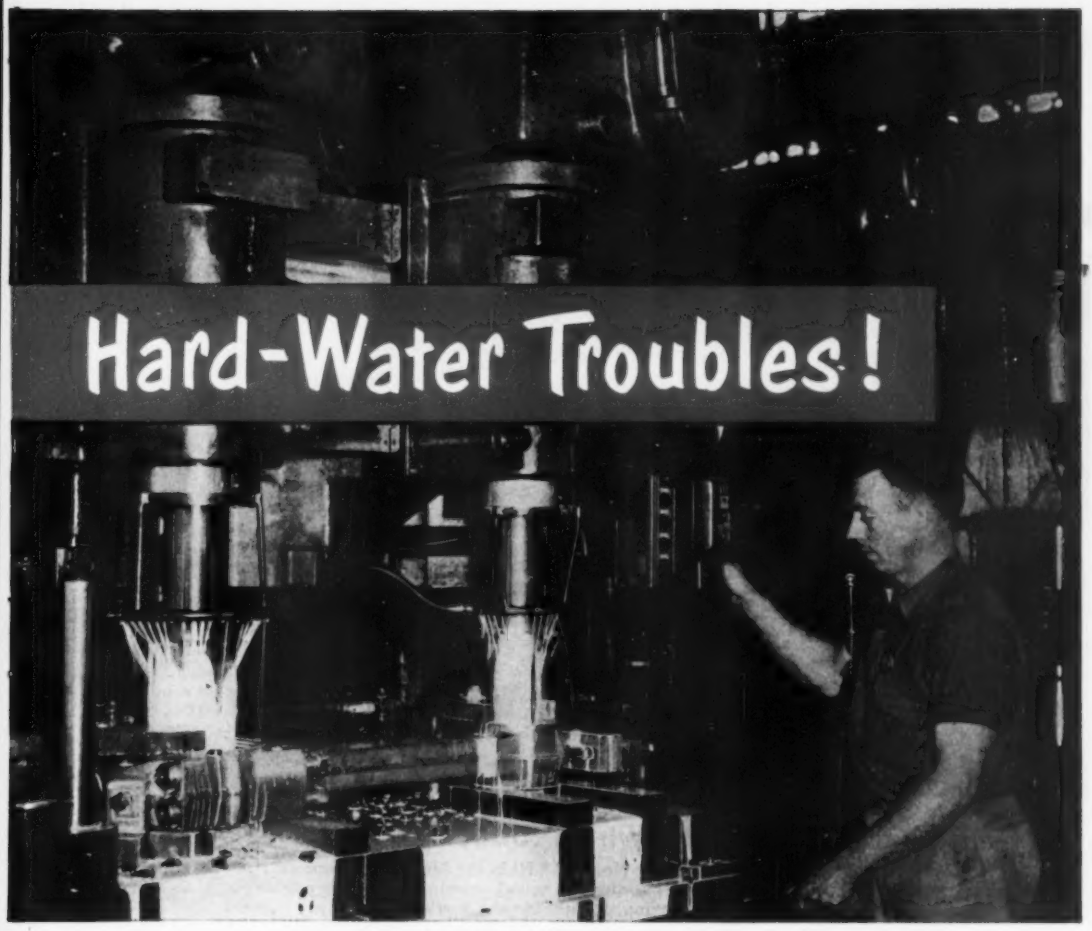
Today NATCO offers you not only fifty years experience and ample production facilities but also several branch offices conveniently located to serve you in Detroit, Chicago, Buffalo and New York City.

To solve your problems in drilling, boring, facing and tapping most economically . . . Call a NATCO Field Engineer Today!

Golden Anniversary

1901 NATCO 1951


This soluble oil Ends
No Rusting
Enhances the Finish
Forms Stable Emulsions
Kind to Skin
SINCLAIR Lubricants



It is not necessary to check your water supply continuously for hardness when you use Sinclair EMULSICOOL for making your cutting emulsion. This specially-developed soluble oil mixes readily into a stable emulsion even under the most severe hard water conditions. In fact it is an "all-water" soluble oil.

Sinclair EMULSICOOL forms an emulsion that does not foam or separate. It helps produce a fine finish in cutting and grinding operations. It will not cause rust, is harmless to the skin, and does away with troublesome gumming of the machine. You'll find EMULSICOOL is economical to use.

Let EMULSICOOL* demonstrate its merits on one of your precision jobs.

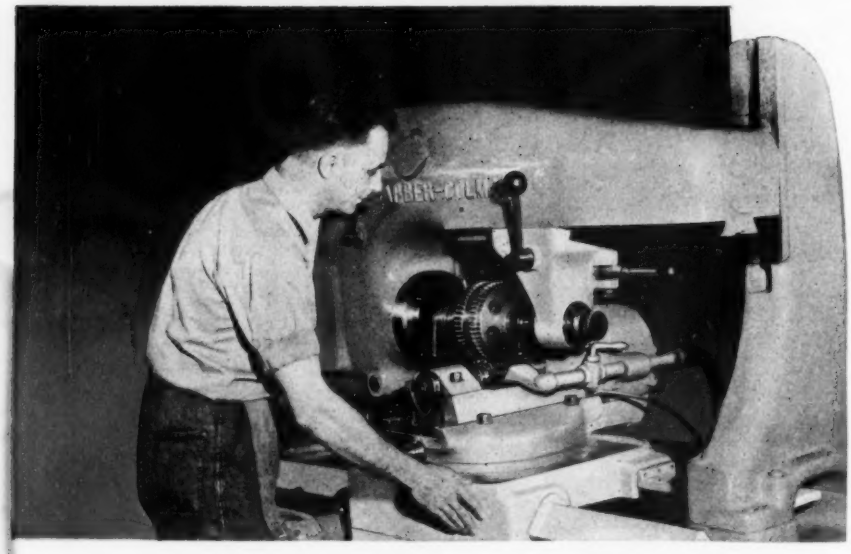
(*Reg. U. S. Pat. Off.)

and Coolants for Metal Working

For lubrication counsel, see your nearest Sinclair representative or write direct to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.

Barber-Colman

No. 14-15 HOBBING MACHINES IMPROVE GEAR QUALITY...TRIM GEAR COSTS

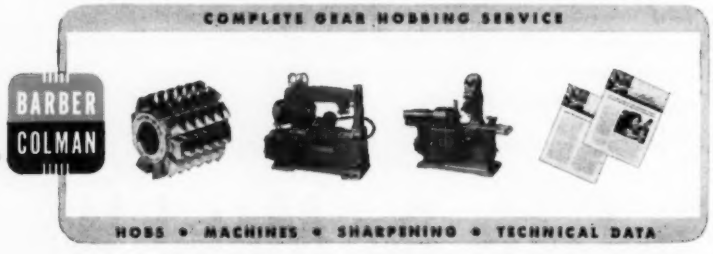


Tooth Profile Checks Within .0003″

Two outstanding features of the No. 14-15 Hobbing Machine provide exceptional gear cutting accuracy. A built-in differential permits successive roughing and finishing cuts without removing or aligning the work. A precision index worm gear, 18⅝″ in diameter, guarantees spacing accuracy within "tenths".

The 7 pitch transmission gears shown here are hobbed 2 per load in 17 minutes. Ground class A hobs, 3⅝″ diameter, are used at 129 rpm. and .090″ feed. Gears have 48 teeth, 11/16″ face and 7.139″ diameter. Average involute check is within *.0003″*. Average adjacent tooth spacing check is within *.0005″*.

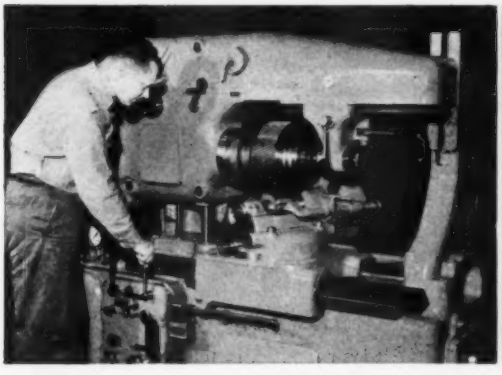
This machine accuracy in hobbing is especially important because tooth spacing errors cannot be economically removed by any known finishing operations.



Machines, like athletes, should be replaced when a substitute can do a better job — not when complete exhaustion forces removal from the field of play.

BUILDERS OF PRECISION GEAR

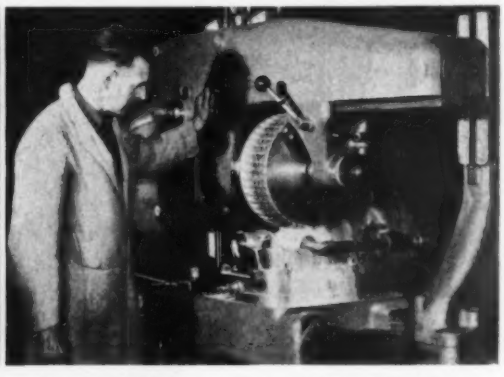
FINISH — HOB HEAVY CUTS IN ONE PASS
CUT HOBBING TIME PER GEAR 1/3 OR BETTER
HOLD LIMITS OF .0005" ON TOOTH SPACING AND PROFILE



Hobbing Time Cut From 33 to 13 Minutes Per Gear

This job shows *Multithread* hobs climb cutting 8 pitch, 11½" diameter helical gears in 13 minutes, compared with former time of 33 minutes. Hobs are 5½" diameter. Hob speed is 60 RPM. Feed of .060" per work revolution is used.

The rigidity and power of the No. 14-15 Machine furnishes ideal conditions for the application of large diameter *Multithread* hobs. The increase in the number of hob threads, large hob diameter, and fast work indexing combine to cut time per gear by nearly ⅓.



Finish-Hob ⅝" Roller Chain Sprockets In A Single Cut

These roller chain sprockets are an example of heavy, one-cut finish hobbing on No. 14-15 Machines. Sprockets are 15.179" diameter and are hobbed 8 per load in 35 minutes. Hob speed of 77 RPM and feed of .20" per minute are used.

Tremendous rigidity, power and weight of the No. 14-15 Machine prevent machine deflection and vibration, making possible such heavy cuts in one pass. This extra ruggedness furnishes single-cut capacity for spur and helical gears as coarse as 3½ pitch in some sizes.

● High output, heavy-cut finishing and extreme accuracy are obtained under normal operating conditions with the No. 14-15 Hobbing Machine. Because of these advantages and the rigidity to meet continuous high production schedules, many gear departments are substituting No. 14-15's for present equipment.

The machine cuts spur and helical gears up to 14" diameter, and as coarse as 3½ pitch in some sizes, as well as spline shafts, sprockets and other hobbed forms. It is widely used for hobbing automotive flywheel ring gears, transmission gears and shafts, rear axle shafts, drive sprockets and steering clutch hubs. You, too, can improve your gear quality and reduce costs by hobbing on the No. 14-15 Hobbing Machine.

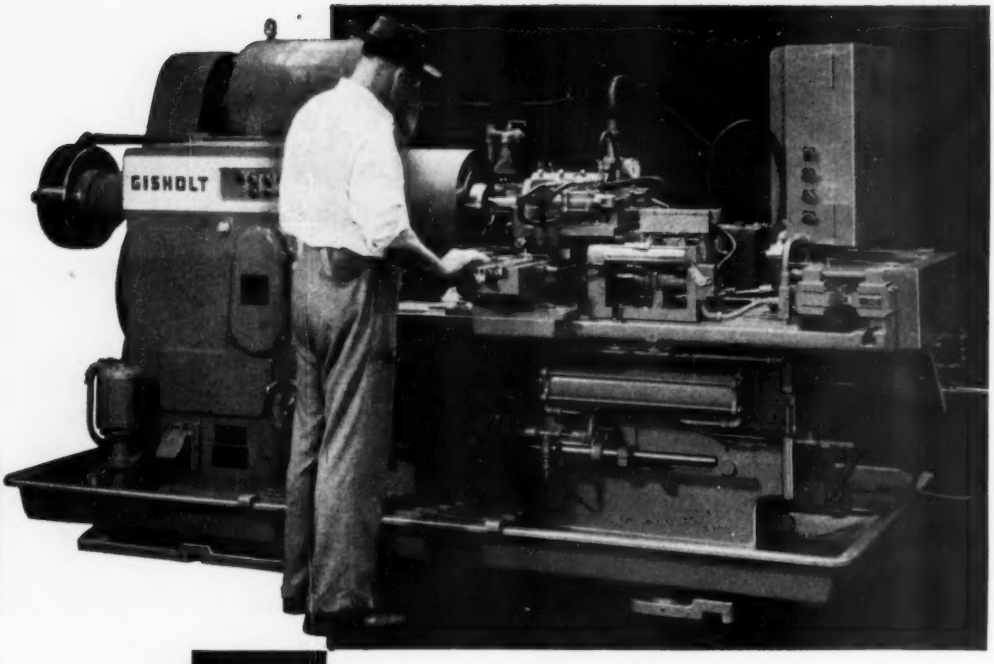
Get the Complete Story . . . .

A new bulletin describes the range, capacity, output and extreme accuracy of the No. 14-15 Hobbing Machine. We'll be glad to send a copy without obligation. Ask for Bulletin No. 113.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 113 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

HOBS AND MACHINES SINCE 1911



HOW 8 SIMPLIMATICS

cut machine time 50%
cut man-hours 75%

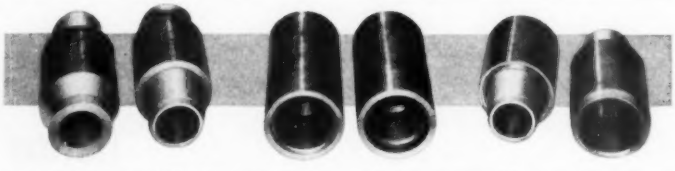
The way you can slash costs with the Gisholt Simplimatic often surprises some of the most experienced production men.

Here's a big shop which found that 8 Simplimatics could take over the job done on 16 other machines. And it takes only 4 operators instead of 16 to turn out the volume of parts required.

Not the least in the cost picture is the machine itself. For the basic Simplimatic design permits you to individualize the machine to a high degree to solve many different problems. Thus, for many jobs you can have all the advantages of a special machine merely with special tooling. Yet it's all done on a Standard Simplimatic—at far lower cost.

The importance of lower costs these days makes it important for you to get all the facts about Simplimatic Automatic Lathes.

The GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*



In producing these tool joint pins and boxes, the 8 Simplimatics work in pairs with fully automatic operation: one man can easily tend two machines.

Ask about the many different arrangements possible on the Standard Simplimatics with platen table, vertical head, etc.

GISHOLT MACHINE COMPANY, *Madison 10, Wisconsin*

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES

WE ARE READY!

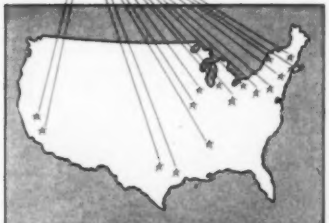
Defense production calls for *precision*—and precision points directly to PRATT & WHITNEY.

P&W Precision has spurred production through four major wars since 1860. It is invaluable today in all Plants, including those of Sub-Contractors. Parts machined and gaged with P&W precision on the home grounds, and in widely separated plants, *fit accurately*.

Right now our huge, completely equipped plant is well primed for *any* emergency. Our experienced engineers and craftsmen are thoroughly trained in the P&W tradition for precision. Know-how, skill and accuracy are reflected in all the equipment they build — P&W *Precision* Machine Tools, Cutting Tools and Gages.

With them, you'll take stepped-up defense production quotas in stride.

PRATT & WHITNEY PRECISION



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- Jig Borers
- Vertical Shapers
- Toolroom Lathes
- Automatic Lathes
- Thread Millers
- Vertical Millers and Profilers
- Die Sinkers
- Automatic Duplicating Machines
- Keller Machines
- Cutter Grinders
- Vertical Surface Grinders
- Die Grinders
- Gear Grinders
- Deep Hole Drillers
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CUTTING TOOLS

- Taps (all types)
- Dies (all types)
- Milling Cutters
- Thread Milling Cutters
- Reamers (all types)
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- Keller Cutters and Tracers
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- Solid Carbide and Carbide Tipped Tools
- Precision Screw Plates
- Kellerflex Steel and Carbide Burs
- Metal Slitting Saws

..AND GAGES

- Cylindrical Gages
- Thread Gages
- Pipe Thread Gages
- Plain Snap Gages
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- A. P. I. Gages
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PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

Symbol of Accuracy
SINCE 1860

THE FIRST DEPARTURE IN BASIC ENGINE LATHE DESIGN

The first totally different lathe in over 100 years

LODGE & SHIPLEY "T" LATHE!

60" RIGHT ANGLE CHUCKING LATHE

Illustration shows Pratt & Whitney stainless steel jet engine shroud. Dimensions are: 48" diameter, 10" wide and 2" wall thickness.

NOW ELIMINATES MAKESHIFT MACHINING OF SHORT, LARGE DIAMETER, THIN-WALLED WORK PIECES

The problem of facing, turning and boring thin-walled section work of large diameter and short length has been solved. The Lodge & Shipley T-Lathe, "a radically new 60" right angle chucking lathe," eliminates the slow, costly, inaccurate and inconvenient use of raised or gap engine lathes or vertical boring mills on this class of work.

With speed, sensitivity, accuracy and accessibility formerly thought impossible, the T-Lathe is more compact, less expensive than conventional machines. The bed is in the shape of a "T". The section of the bed carrying the carriage is at right angles to the center line of the lathe.

The Lodge & Shipley T-Lathe is not a single purpose machine. Developed by Lodge & Shipley in conjunction with Pratt & Whitney Experimental Div., one of the nation's leading turbo-jet engine manufacturers, for use on jet engine shrouds and similar parts, it is extremely versatile. Also, this lathe has been designed for tracer control and variable speed drive if required. Write for detailed information.

The T-Lathe can be supplied with 2 different headstocks and other modifications. Check these condensed specifications for model illustrated.

Maximum swing	60"
Diameter of std. face plate	37"
Facing carriage travel	31" to front, 6" to rear
Compound rest travel	12" forward, 4" back
Compound swivel range	90 degrees
Std. maximum length of workpiece	12" to 15"
Std. range of spindle speeds	24 speeds: 4-225 RPM
Std. range horsepower ratings	4 HP @ 4 RPM 15 HP @ 14-225 RPM
Range of feeds	55 feeds: .001"—.064"

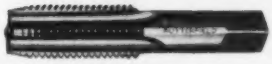
THE Lodge & Shipley COMPANY
MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

FOR BEST RESULTS
IN ANY TAPPING JOB
DEPEND ON BUTTERFIELD,
THE LINE THAT'S

100% INSPECTED...
100% COMPLETE!

FOR EXAMPLE...

Hand Taps



Standard. High speed or carbon steel.

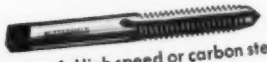
Three-Fluted. High speed or carbon steel.

Spiral Pointed. High speed or carbon steel. For tapping deep through holes or holes deep enough to allow bottom chip clearance.

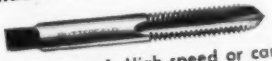
Spiral Fluted. High speed steel. Correct spiral for free cutting while ejecting chips from hole.

Stub Fluted. High speed steel. For threading holes in thin sections.

Machine Screw Taps



Standard. High speed or carbon steel.



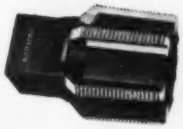
Spiral Pointed. High speed or carbon steel. For tapping deep through holes or holes deep enough to allow bottom chip clearance.

Stub Fluted. High speed steel. For threading holes in thin sections.

Pipe Taps

Taper or Straight. High speed or carbon steel.

Interrupted Thread. High speed steel.



Inserted Chaser. High speed steel.

And **MANY OTHERS, INCLUDING...**

STOVE BOLT TAPS • PULLEY TAPS • STAYBOLT TAPS
BOILER TAPS • NUT TAPS • SERIAL TAPS
TAPPER TAPS • MUD OR WASHOUT TAPS

Remember: There's a Butterfield Tap for top performance in every material.

SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE

Union Twist Drill Company

BUTTERFIELD DIVISION

Derby Line, Vermont • In Canada: Rock Island, Quebec

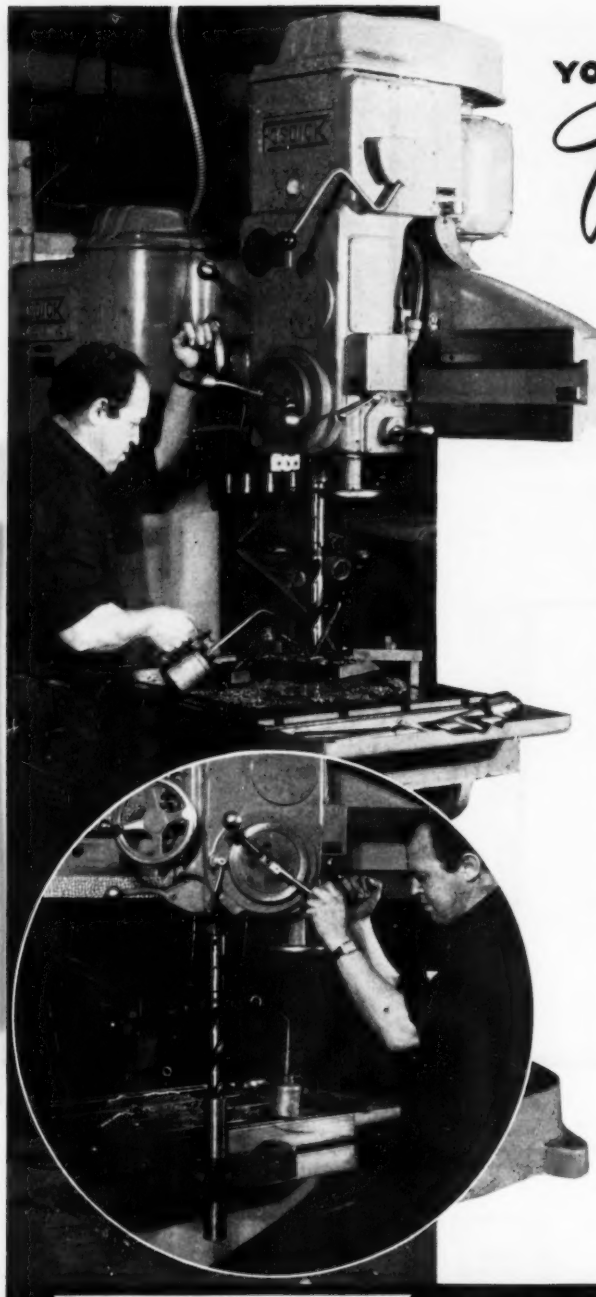
Bar stock being tested for microstructure . . . one step in Butterfield's 100% inspection.

BUTTERFIELD

THE 100% INSPECTED TOOLS

Every Tool Individually Inspected

TAPS • DIES • REAMERS • SCREW PLATES



YOU GET

Versatility

with a

FOSDICK *Sensitive* RADIAL

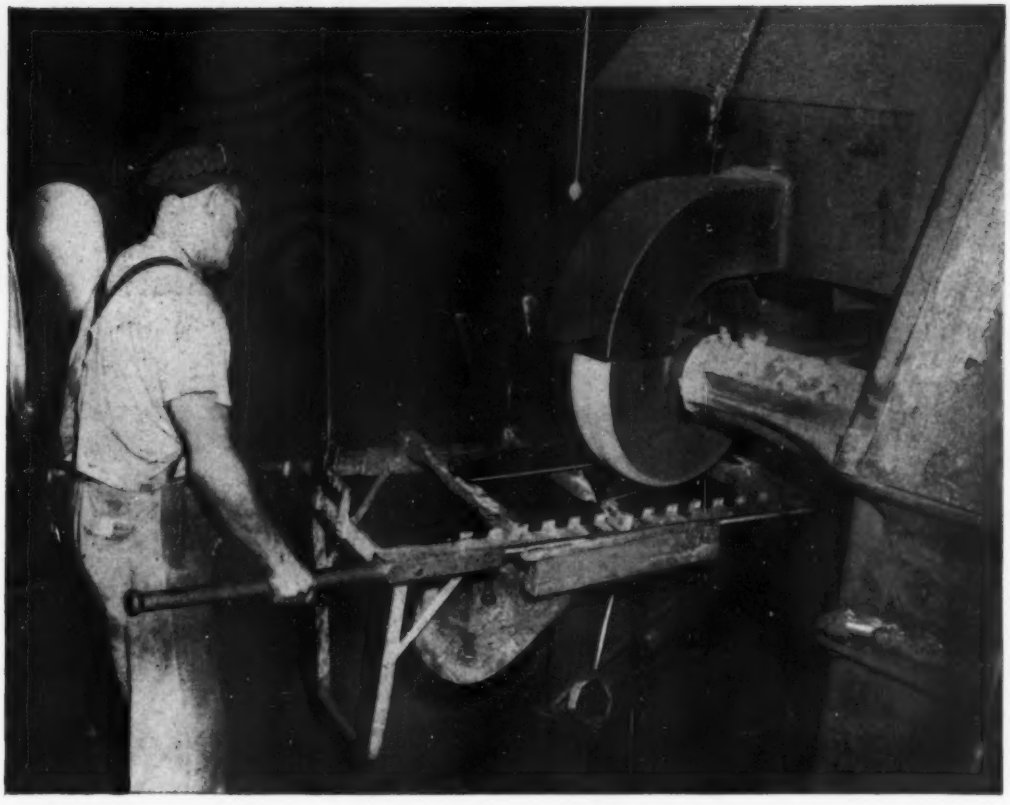
The unique design of the FOSDICK Sensitive RADIAL which combines sensitive drilling with the flexibility of radial construction makes it a very versatile machine tool.

The photo and inset, left . . . clearly illustrate the type of machine flexibility you can get with a FOSDICK Sensitive RADIAL . . . resulting in a big saving of time, money and fewer rejects.

Here are some of the features that make the FOSDICK Sensitive RADIAL the big favorite among production men and operators . . . elevating table adjustable on sturdy one piece column puts work in proper location in relation to the spindle at all times. . . . Both the arm and the table swing in a 360° arc . . . the arm at fixed height is easily reached from operator's normal position . . . head provides nine speeds and four feeds. . . . Control levers for both feeds and speeds are direct reading and right at the operator's fingertips.

For complete information on this new, versatile machine write for FOSDICK Sensitive RADIAL Bulletin SRA.

FOSDICK MACHINE TOOL CO.
CINCINNATI 23, OHIO



Why a Set-up Wheel?

For producing certain finishes and shapes today — there is no substitute for set-up wheels. In an increasing number of cases, however, belts and other abrasive products by CARBORUNDUM are coming into use, with marked success, where polishing grain had previously been used exclusively.

Behind this changing production pattern are new machines and techniques — matched at every step by new developments in abrasives and abrasive applications by CARBORUNDUM. Of equal importance to you, the user of abrasives, is our impartial recommendation of those abrasives best suited to your own job requirements.

Your CARBORUNDUM representative is a trained specialist who will be glad to help you select and apply abrasive products — including those which incorporate the latest developments in the field . . . whether they be polishing grain, coated or bonded abrasives.

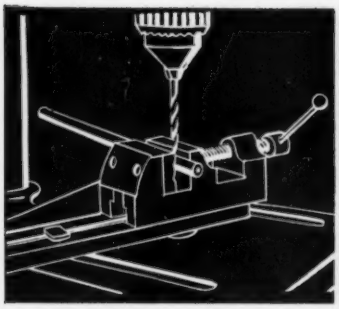
Next time, call in CARBORUNDUM.

Only CARBORUNDUM

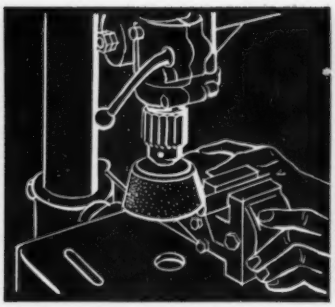
TRADE MARK

makes ALL abrasives to give you the proper ONE

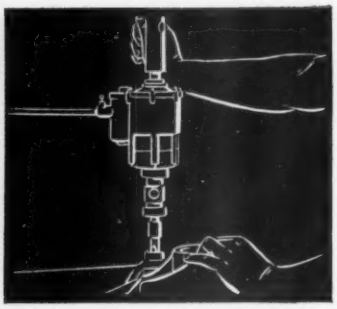
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N. Y.



For drilling— capacity to ½" drills. A wide range of speeds and dependable accuracy make this an ideal machine for all shops.



For surface grinding— a flare cup or recessed wheel equips the drill press to handle many different surface grinding operations.



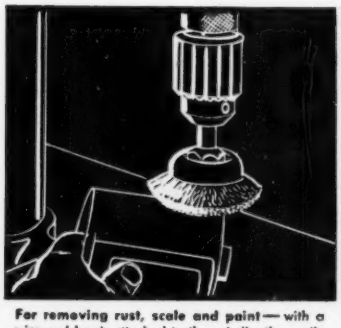
Precision, high-speed tapping is done by simply installing a tapping attachment on the machine spindle.

DRILLING is only one of many jobs you can do with a WALKER-TURNER DRILL PRESS

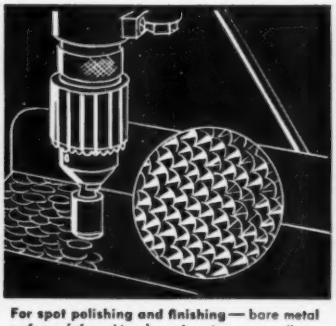
When you use Walker-Turner machines you profit not only from their great versatility, but from the operating efficiency and long service life of these modern power tools.

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

SOLD ONLY THROUGH AUTHORIZED DEALERS



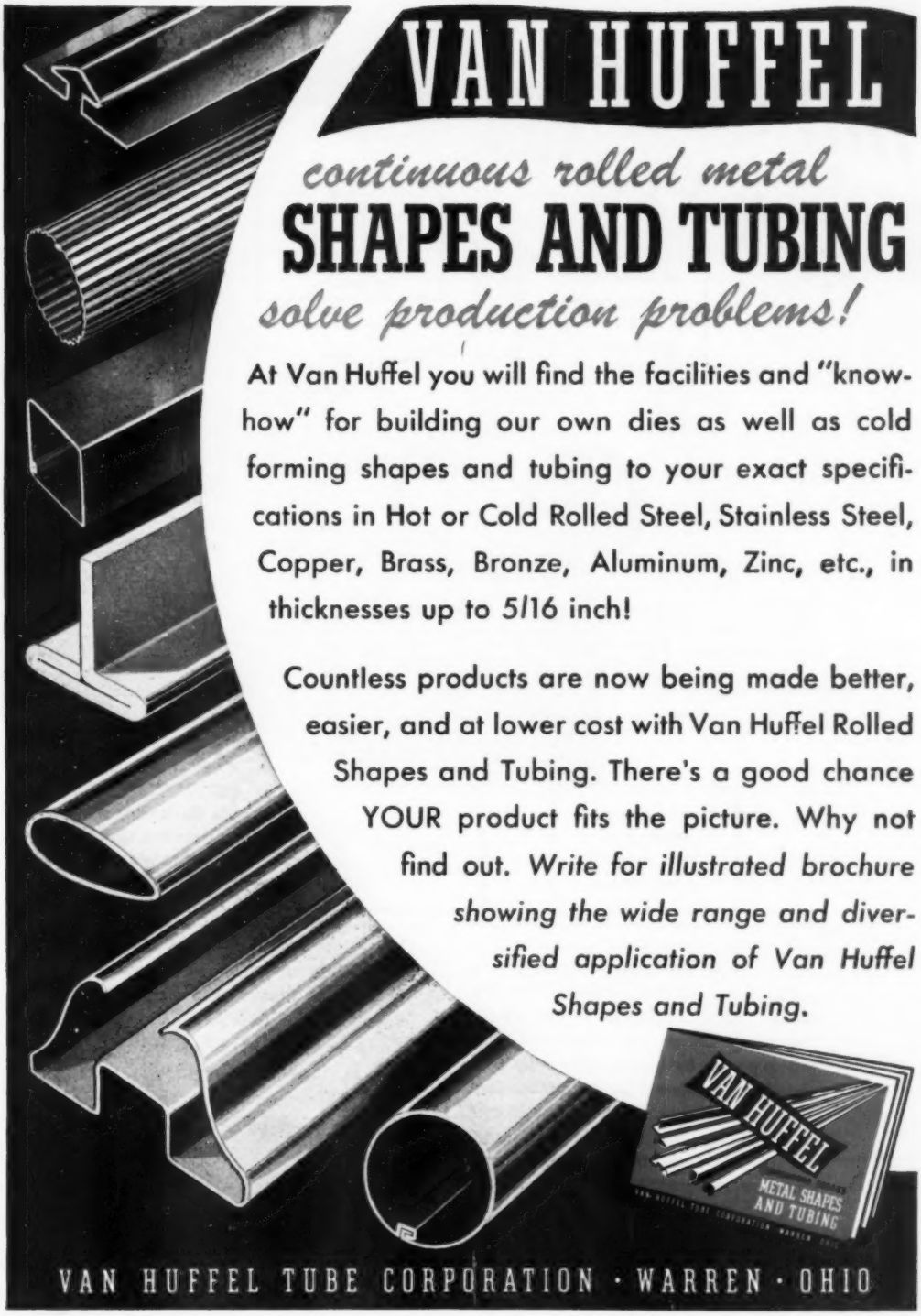
For removing rust, scale and paint— with a wire end brush attached to the spindle, the easily controlled pressure of the drill press readily removes hard incrustations such as these.



For spot polishing and finishing— bare metal surfaces (of machines) can be given a new "precision" finish by using an improvised polishing tool and running drill press at slow speed.

Abrasive polishing of valves is a simple, easy operation with a Walker-Turner Drill Press and the special set-up shown above. Abrasive cloth, backed by rubber, does the polishing.

DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS • BELT and DISC SURFACERS
METAL-CUTTING BAND SAWS • METAL-SPINNING LATHES • SPINDLE SHAPERS • JOINTERS


VAN HUFFEL
continuous rolled metal
SHAPES AND TUBING
solve production problems!
At Van Huffel you will find the facilities and "know-how" for building our own dies as well as cold forming shapes and tubing to your exact specifications in Hot or Cold Rolled Steel, Stainless Steel, Copper, Brass, Bronze, Aluminum, Zinc, etc., in thicknesses up to 5/16 inch!
Countless products are now being made better, easier, and at lower cost with Van Huffel Rolled Shapes and Tubing. There's a good chance YOUR product fits the picture. Why not find out. Write for illustrated brochure showing the wide range and diversified application of Van Huffel Shapes and Tubing.
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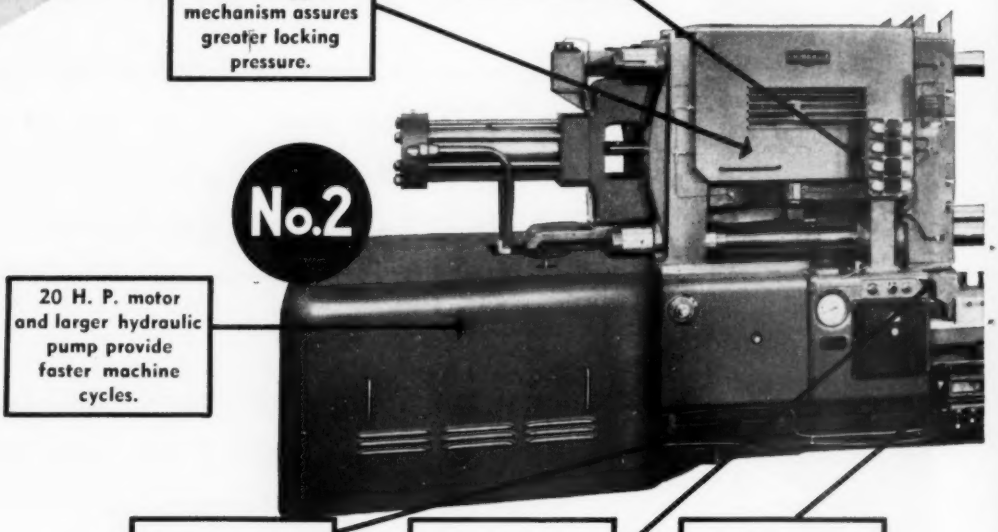
IMPROVED Reed-Prentice "COMBINATION"

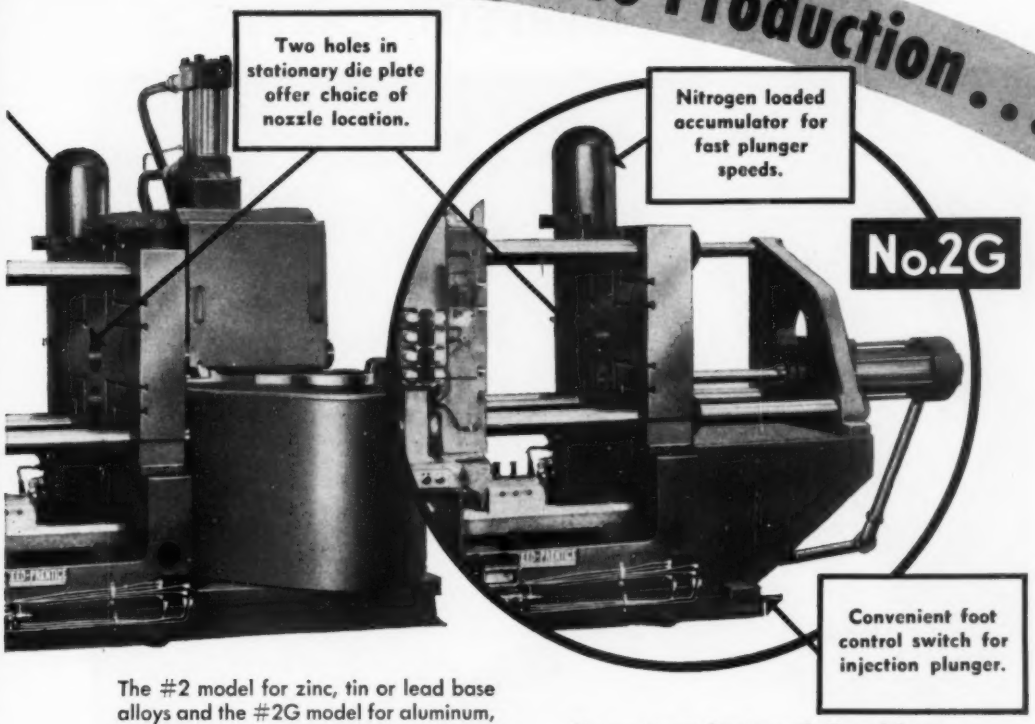

Nitrogen loaded accumulator for fast plunger speeds.
Centralized lever operated control station for dies, plunger and core cylinders.
Heavier double shear toggle mechanism assures greater locking pressure.
No.2
20 H. P. motor and larger hydraulic pump provide faster machine cycles.
Heavy, one-piece fabricated steel base insures rigidity.
Sliding support brackets for movable die plate.
Built-in water cooling system for plunger and dies.

Just as die casting is the answer to low-cost, volume production of non-ferrous parts, improved Reed-Prentice "Combination" machines provide the answer to producing better die castings at far less expense. By getting either the cold chamber attachment or the furnace unit separately, you can keep investment cost at a minimum and have the advantage of two-machine utility with a single standard machine.

If you are considering the purchase of die casting equipment, investigate thoroughly the merits and economies of Reed-Prentice "Combination" machines. Compare their operating features, safety devices, rugged construction, versatility and other advantages. When you have done this, we believe you will decide on production-proven Reed-Prentice machines.

BRANCH OFFICES: NEW YORK: 75 West St. • LOS ANGELES: 2314 So. Santa Fe Ave.
CLEVELAND: 1213 W. 3rd St. • CHICAGO: 2400 W. Madison St.

Die Casters for Mass Production . . .


Two holes in stationary die plate offer choice of nozzle location.
Nitrogen loaded accumulator for fast plunger speeds.
No.2G
Convenient foot control switch for injection plunger.

The #2 model for zinc, tin or lead base alloys and the #2G model for aluminum, magnesium or brass alloys pictured above illustrate the same sound design of the #1½ and 1½G machines including the interchangeability feature which is also incorporated in the smaller #1 and #1G models.

The main specifications of all models are listed below. If you desire further details on any particular machine, or on the complete line, call in a nearby Reed-Prentice representative or write our main office.

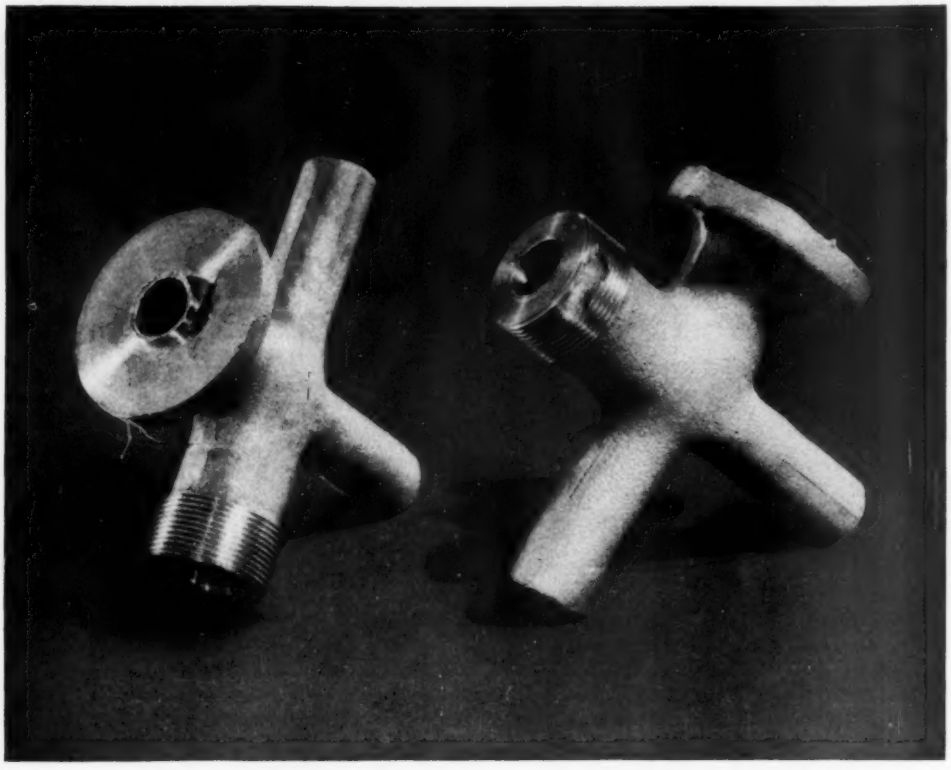
SPECIFICATIONS	#0	#1	#1G	#1½	#1½G	#2	#2G
Size of die plates (VxH)	10 x 10"	16 x 21"	16 x 21"	32 x 29"	32 x 29"	38 x 36"	38 x 36"
Diameter of tie bars	1½"	3"	3"	4"	4"	4"	4"
Space between bars (VxH)	8¼"	12"	12"	20 x 15"	20 x 15"	24 x 24"	24 x 24"
Die Opens	4"	8"	8"	10"	10"	14"	14"
Maximum die space	4"	14"	14"	22"	22"	30"	30"
Capacity per shot (Lbs.)	1-zinc	5.75-zinc	2.35-alum.	10.5-zinc	3.75-alum.	15-zinc	9-alum.
Net weight (Lbs.)	1,500	8,000	7,200	16,500	14,500	24,750	22,700

MAIN OFFICE:
677 Cambridge St.
Worcester, Mass.

DIE CASTING
REED-PRENTICE CORP.
WORCESTER MACHINES MASS., U.S.A.

REPRESENTATIVES:
Detroit ..... Kordenbrock Machinery Co.
Grand Rapids ..... Joseph Monahan Co.
Syracuse ..... J. F. Owens Machinery Co.
Houston ..... Preston Machine Tool Sales Co.
Seattle & Spokane ..... Star Machinery Co.
Minneapolis ..... Chas. W. Stone Co.

AN ALIBI WON'T BRING BACK MONEY WASTED MACHINING IMPERFECT CASTINGS!



So put your confidence in radiography . . . one of management's surest instruments for cutting cost!

An outstanding example of the contribution of radiography to production processes is revealed by an automobile manufacturer. By pointing the way to improved foundry techniques — radiography is credited with saving this company in excess of a quarter million dollars a year in one part alone.

Another story of savings and profit made possible through the magic of radiography. A double-edge tool that not only diagnoses accurately and authoritatively — but suggests treatment as well.

Radiography shows where savings can be made, designs improved, new techniques developed. Write for interesting, informative booklet, "Radiography as a Foundry Tool." General Electric X-Ray Corporation, Dept. AB-3, Milwaukee 14, Wisconsin.

GENERAL ELECTRIC X-RAY CORPORATION

Shock-proof high speed steel segmental saws
for economical efficiency

Designed for service in the most modern heavy duty cold sawing machines, Atkins high speed *"Silver Steel"* Curled Chip segmental saws are provided new measures of continuous, trouble-free performance! . . . Here are *the* saws that are meeting the toughest requirements of steel mills, forge plants, ordnance works — coming through with flying colors where fast, quantity production schedules are the order of the day!

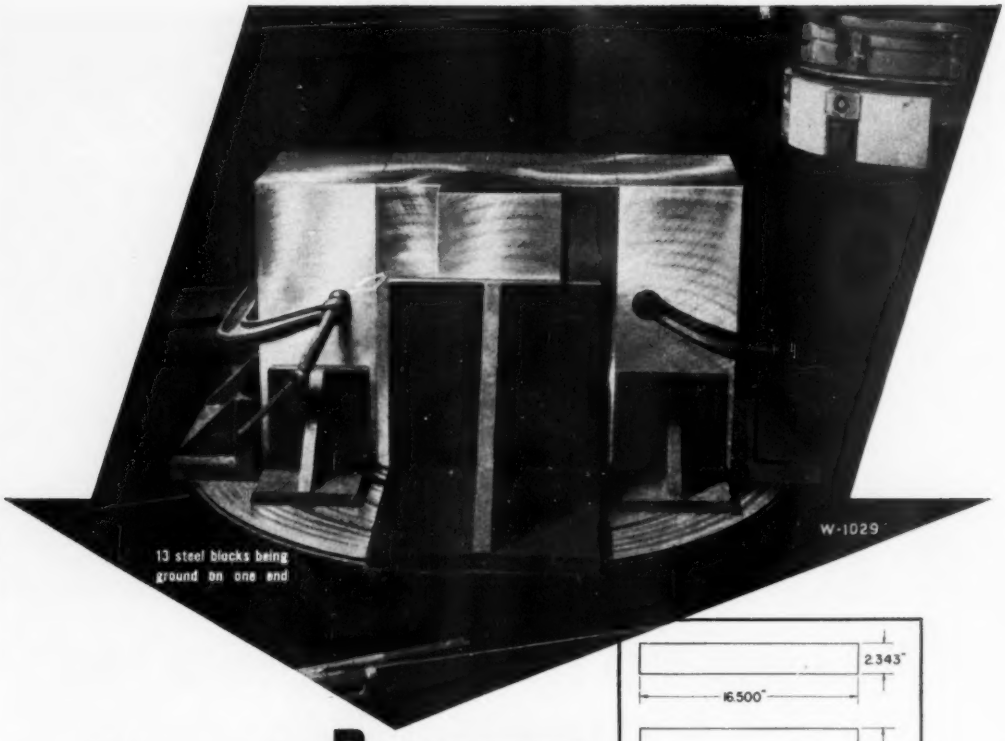
Replaceable tooth-segments, of the highest quality, high-speed steel, provide an economical method of replacing worn-out teeth — *without expensive discarding of saw discs!* . . . The Atkins scientific tooth form reduces the horsepower required per cubic inch of metal removed and minimizes breakage due to old chips jamming the cut! . . . For billet sawing, ingot cropping, bar cut off, gear blanks — steel, cast iron, copper, alloys, bronze, brass, aluminum.

Only ATKINS makes *"Silver Steel"* products

E. C. ATKINS AND COMPANY
Home Office and Factory: 402 S. Illinois Street, Indianapolis 9, Indiana
Branch Factory: Portland, Oregon • Knife Factory: Lancaster, New York
Branch Offices: Atlanta • Chicago • Portland • New York

AAA TRADE MARK ATKINS "ATKINS ALWAYS AHEAD"

ATKINS



Put it on the BLANCHARD

√. . . for stock removal

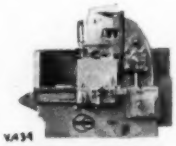
These annealed steel blocks were ground on all 6 surfaces on a Blanchard No. 18 Surface Grinder. Rough size was 16¾" x 7⅛" x 2½". *37.439 lbs. of metal were removed from each piece!*

√. . . for speed

Thirty of these steel blocks were ground on all 6 surfaces in 42½ hours. *This is a floor-to-floor time of only 85 minutes each.* All surfaces were ground square within .002", and flat and parallel.

√. . . for comparison

Let Blanchard grind some sample parts, or give you estimates from prints of your surface machining jobs. A comparison with your present methods may surprise you!

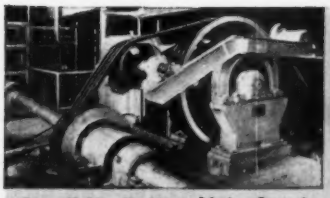


NO. 18 BLANCHARD SURFACE GRINDER

Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



Paper Making Machine—Motion Control *Vari-Pitch* drive synchronizes paper machine sections.

Air Conditioning unit — Stationary Control *Vari-Pitch* drive provides for seasonal adjustments.

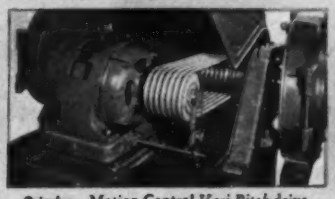
TEXROPE Drives for Speed Control

Cigarette Making Machine — Stationary Control *Vari-Pitch* drive provides for infrequent speed changes.

Pipe Threading Machine—Automatic *Vari-Pitch* drive gives simple, stepless handwheel speed changes.

Solids Handling Pumps—Double Motion Control *Vari-Pitch* drive provides extra wide speed range.

Automatic lathe — Automatic *Vari-Pitch* sheave gives stepless speed changes for making ultra-fine finish.



Grinder—Motion Control *Vari-Pitch* drive holds cutting speed constant as diameter of wheel wears.

Conveyor — *Vari-Pitch* Speed Changer raises or lowers speed to meet production requirements.

HOW USERS PROFIT
With *Texrope* Adjustable Speed Drives

TAKE A TIP from these users. Get the speed you need for peak efficiency by adding *Texrope* variable speed drives. Best of all, no elaborate equipment — no special costly motors are required.

You'll increase efficiency . . . get maximum output when you adjust speed to meet variations in: the part processed; tooling; machine loading; and temperature and humidity.

There's a type or size *Texrope* adjustable speed drive to fit any requirement. Whether you need to change speeds rarely or frequently — when the machine is shut down, or when it's running — whether you're using one horsepower or 50, Allis-Chalmers can supply you.

In addition, Allis-Chalmers offers you more than the drive itself. A-C offers the extra engineering skill that naturally results from having more industrial V-belt installations than any other manufacturer. This in itself is important.

Get section 20P50 for complete engineering information on *Vari-Pitch* sheaves from your A-C Authorized Dealer or Sales Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Choose from These Types of Variable Speed Drives

VARI-PITCH SHEAVES for A-B, B, C, D, and E belts — speed variation 15% to 25% per sheave. Capacities 1 to 125 hp. Stationary type — for changing speed when motor is stopped. Motion Control type — for changing speed when motor is running.

WIDE RANGE VARI-PITCH SHEAVES for Q or R wide belts provide up to 2 to 1 speed range . . . fractional to 40 hp. Available in Stationary Control and Automatic types.

VARI-PITCH SPEED CHANGER — enclosed unit for adjusting speed while machine is in motion. Provides up to 3.75 to 1 speed range. Capacities 1 to 75 hp.

A-3262

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

SWISS **REISHAUER** MADE

UNIVERSAL THREAD and WORM GRINDERS

For Production or Tool Room Grinding Operations

The Type NRK UNIVERSAL Thread and Worm Grinder is designed for grinding with single or multi-thread wheels. This machine, with attachments, can be used for grinding and relief-grinding of external—right- and left-hand—single or multiple screw threads—to any desired profile.

THE NRK GRINDS:

- **Thread Gauges**
- **Taps—all kinds—straight or spiral flutes**
- **Thread Milling Cutters**
- **Trapezoidal Thread Spindles**
- **Chasers**
- **Thread Chaser Dies for self-opening die heads**
- **Worms up to 3″ pitch**
- **Spur Wheels and Worm Hobs**
- **Cylindrical Press-Rollers for thread rolling dies**
- **Crushers for forming multi-thread grinding wheels**
- **Threads on all kinds of screws, studs, spindles, etc.**
- **Internal Threads up to 5″ diameter.**

CAPACITY AND SPEEDS

Admits work pieces between centers	28″
Maximum length of thread ground	17-½″
Minimum thread diameter	.120″
Maximum thread diameter	8″
Minimum pitch	60 t.p.i.
Maximum pitch	3″
Width of single thread grinding wheel	.32″
Widths of multi-thread grinding wheel	.8″ - 1.2″ - 1.6″
Speeds of grinding wheel	1550 or 1900 r.p.m.
Speeds of work spindle	1.6 to 80 r.p.m.

SEE THESE MACHINES IN OPERATION AT COSA'S NEW YORK SHOW ROOM OR SEND FOR DESCRIPTIVE LITERATURE.

COSA CORPORATION
405 Lexington Ave., New York 17

NATIONAL REPRESENTATIVES FOR: REISHAUER—Gear & Thread Chaser Grinders—Lead Screw Lathes • BECHLER—Swiss Automatics—Cam Shapers • DECKEL—Engravers and Copy Millers • MICAFIL—Coil Winders • SALLAZ—Burnishing Machines • SCHUTZ—Forming and Cutting-Off Machines STUDER—Profile Grinders.

CARD Pipe TAPS

Double-Checked To Assure Top Performance At Ordinary Cost!

Card goes a long way beyond routine factory inspection to assure standardized accuracy. We employ the famous Pittsburgh Testing Laboratory to buy Card Taps anywhere on the open market — and to test them thoroughly, certifying the results.

That's why the Card Taps *you* buy are certified* — and why you can depend on every one for the same unfailing dependability and long, economical service life. And remember: *Card Certified Taps cost no more than ordinary taps!*

Your nearby Card Distributor can supply you with Card Pipe Taps — or other Card Taps — in the types and sizes you need. Contact him for prompt, helpful service.

The C.A.R.D. Quality

TAPS

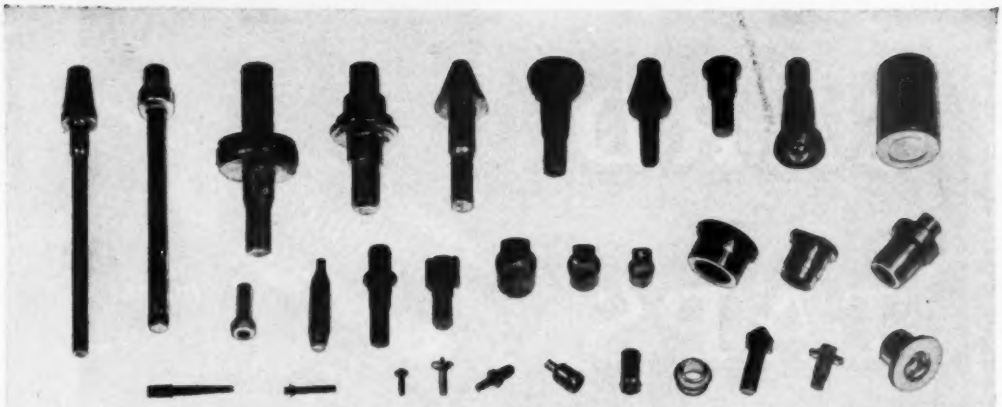
The Certified Cutting Tools*

*by the Pittsburgh Testing Laboratory

Also makers of DIES • SCREW PLATES
DIE STOCKS • TAP WRENCHES

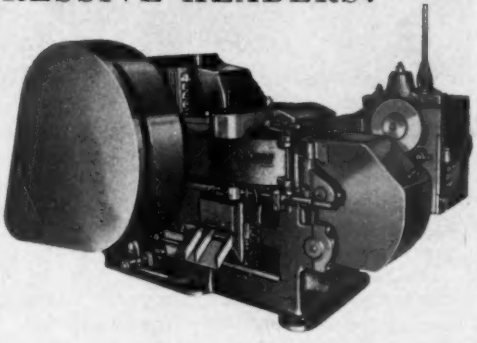
S. W. CARD

MANUFACTURING COMPANY
Mansfield, Massachusetts
DIVISION OF UNION TWIST DRILL CO.



COLD-FORGE YOUR "GADGETS" ON NATIONAL PROGRESSIVE HEADERS!

Multi-Station Machine Produces Close-Tolerance Parts *Seven to Fifteen Times Faster* Than Machining Methods . . . Reduces Material Waste Up to 50% . . . .



National Progressive-Type Headers are considered "The Gadget-Makers of Cold-Forging" because their range includes a wide variety of odd-shaped metal parts.

In the Progressive Header Method, the blank is cut off and progressively transferred through two or more sets of punches and dies, producing work previously considered too complex for high-speed cold-forging.

If your work involves double and triple extrusion—or multiple heading in two or more die impressions—then it is especially suited to the National Progressive Header Method.

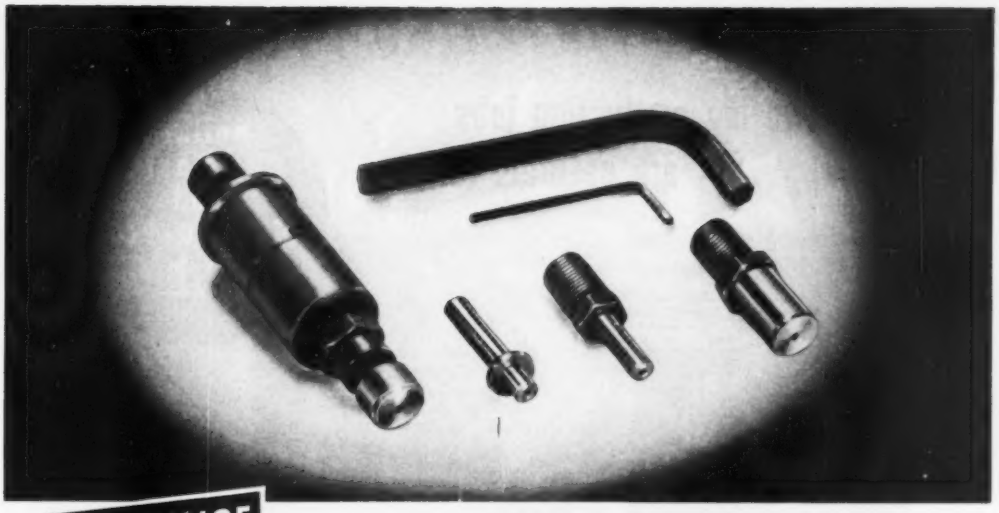
THIS DOOR IS ALWAYS OPEN

Let us help you apply National's experience in hot and cold forging to your jobs. Send us prints or samples of your work, or better yet, pay us a visit. No obligation.

NATIONAL MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET, AND WIRE NAIL MACHINERY

Hartford Detroit Chicago



HARDINGE
ELMIRA, N.Y.

UNIVERSAL COLLET STOP SET

For Your Second Operation Chucking Work

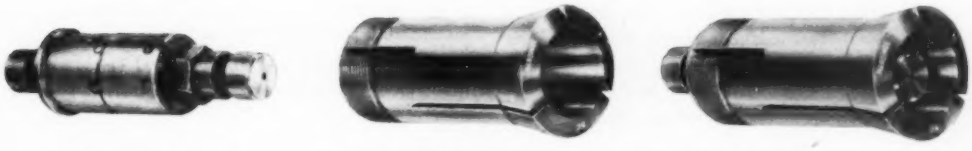
. . . Converts standard 1" capacity 5C Hardinge Collets into solid stop or spring ejector stop collets *without alteration* of the standard collets. Also fits other 1" capacity lathe collets, regardless of the collet length.

Application does not require machining of the collet. The stop is merely placed in the collet.

With the Hardinge Universal Collet Stop Set, it is easy to chuck parts to a predetermined depth in the collet for completing second operations. The set provides either a solid stop or spring ejector stop for small or large diameter work. Each insert is adjustable to suit varying requirements. Once that is done, you merely apply the complete collet stop and tighten a lock screw to securely anchor it inside the collet.

•

The use of a Hardinge Universal Collet Stop eliminates your buying special step collets or applying permanent stops. You save time and money. Write and ask for bulletin CS giving further details and price.



UNIVERSAL COLLET STOP + STANDARD COLLET = SPECIAL STOP COLLET

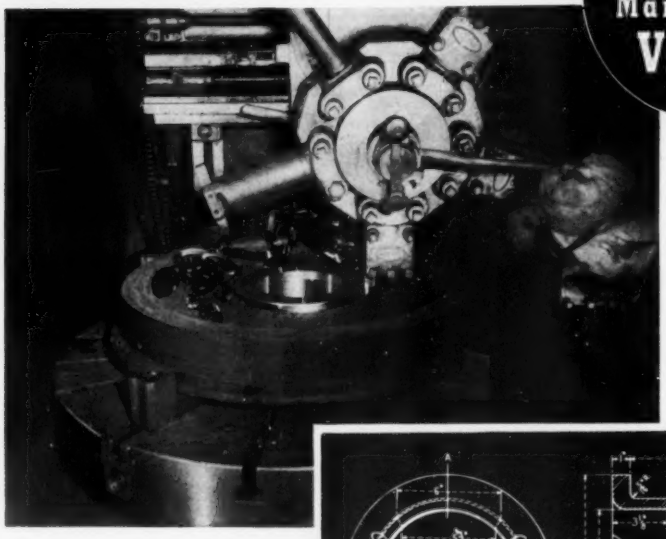
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Keeping Diesels Going . . .

These two big production jobs are naturals for the –

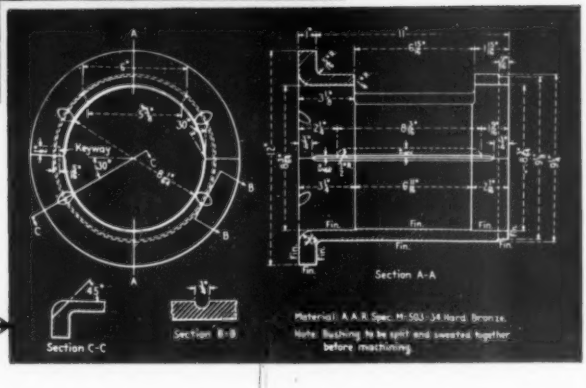
Bullard Cut Master and Man-Au-Trol V.T.L.'s



For an ample supply of accurately machined balanced WHEELS . . .

and

. . . traction motor support bearings →


Keyway
Section A-A
Section C-C
Section B-B
Material: A. A. R. Spec. M-503-34 Hard Bronze.
Note: Bushing to be split and sweated together before machining.

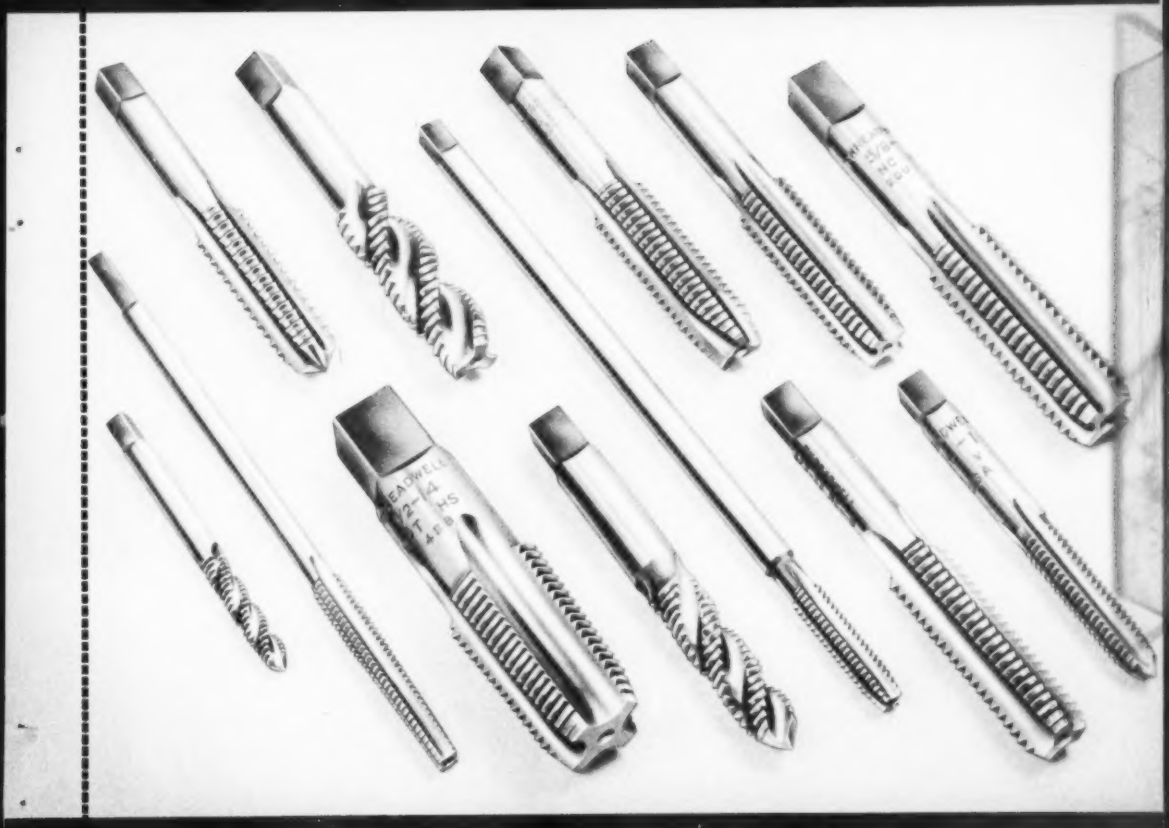
Always versatile machine tools in railroad shops, Bullard machines continue to make themselves useful in maintaining high diesel availability. Many shops have also discovered the convenience and economy of using them for producing traction motor support bearings, of which large quantities are used by railroads. Ask Bullard for full information regarding this use.

Bullard Cut Master and Man-Au-Trol Vertical Turret Lathes are available in six sizes, from 30" to 74".

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

Threadwell TAPS



THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

TABLE OF SPEEDS Fractional Size Taps

Diam. Inches	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Feet per Min.	REVOLUTIONS PER MINUTE												
20	306	245	204	175	153	122	102	88	77	68	61	56	51
25	383	306	255	219	191	153	128	109	96	85	77	69	64
30	458	367	306	262	229	183	153	131	115	102	92	83	76
35	535	428	357	306	268	214	179	153	134	119	107	97	89
40	611	489	407	349	306	244	203	175	153	136	122	111	102
50	764	611	509	437	382	306	255	218	191	170	153	139	127
55	841	673	560	480	420	336	280	240	210	187	168	153	140
60	917	733	611	524	458	367	306	262	229	204	183	167	153
65	993	795	662	568	497	397	331	284	249	221	199	181	166
70	1070	856	713	611	535	428	357	306	267	238	214	194	178
80	1222	978	815	698	611	489	407	349	306	272	244	222	204
90	1375	1100	917	786	688	550	458	393	344	306	275	250	229
100	1528	1222	1019	873	764	611	509	436	382	340	306	278	255
110	1681	1345	1120	960	840	672	560	480	420	373	336	306	280
120	1833	1467	1222	1048	917	733	611	524	458	407	367	333	306
130	1986	1589	1324	1135	993	794	662	568	497	441	397	361	331
140	2139	1711	1426	1222	1070	856	713	611	535	475	428	389	357
150	2292	1833	1528	1310	1146	917	764	655	573	509	458	417	382

Threadwell

Threadwell Tools do many jobs

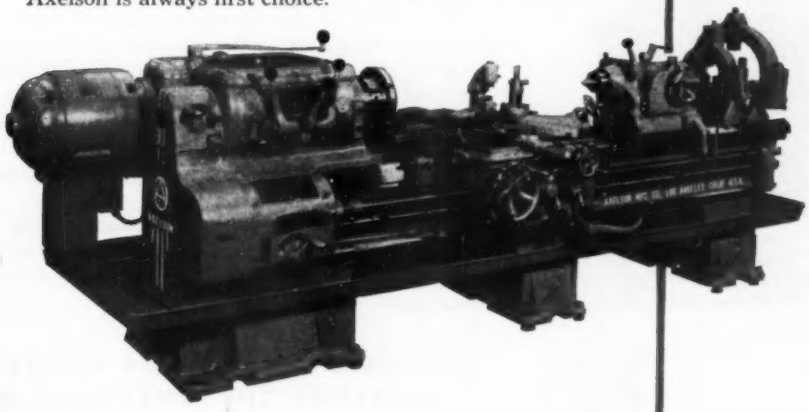
they can do your tough ones

THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

AXELSON
FIRST CHOICE
in heavy duty engine Lathes

For over a third of a century Axelson heavy duty engine lathes have been first choice of production executives.

Axelson lathes produce more work of higher quality with fewer rejects at lower unit costs... and more net profit per dollar of capital investment. Long experience of users proves it pays to choose Axelson — that's why Axelson is always first choice.



AXELSON *Lathes*

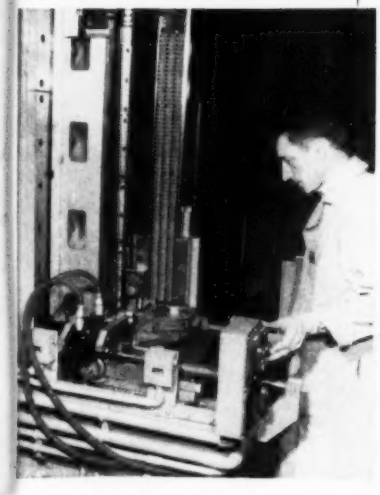
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

DEPENDABLE FOR OVER A THIRD OF A CENTURY

AXELSON MANUFACTURING COMPANY Los Angeles 58, New York 7, St. Louis 16, Tulsa 1

Authorized distributors in all principal industrial centers

broached in a single pass ... the AMERICAN way



Combining *two* operations on an American SB 48-15 Single Ram Vertical Hydraulic Surface Broaching Machine enabled this automotive engine manufacturer to broach the radius and pad (which are non-adjacent) of the front engine cover *in one pass.*

The tooling for this operation consists of generating type broaches and shaving blades mounted on the main machine slide for broaching the radius and joint surfaces. In addition, a special hardened and ground guide is mounted on the table to guide generating type broaches and shaving blades which are pulled down by adapting the lower end of the holder to the machine slide. These broach the pad thus completing the two operations in one pass.

Automatic clamping, plus an automatic sliding table are two additional features of this American installation that help maintain a production rate of approximately 115 parts per hour at 85% efficiency.

Write for your copy of American's Circular 300.

YOU CAN SOLVE YOUR BROACHING PROBLEMS THE AMERICAN WAY

This is only one of thousands of problems solved during American's 25 years of experience in the manufacture of broaching machines, broaches, and broaching fixtures. A part-print or sample and hourly requirements are all it takes to start American engineers working on your problem. Write today!

American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

FOR PRECISION *THREADS

GET GROUND-THREAD-CHASER

NAMCO TAPS

You'll get smooth threads every time with ground-thread-chasers —and ground threads are a feature employed on every Namco chaser, either circular or adjustable-blade type. Illustrated is a Namco RST Tap, equipped with six adjustable blade chasers.

* **CLASS 3 THREADS**

on this 2⅛"-16 pitch tapped ring are produced by a Namco RST Collapsible Tap on a 5½" Acme-Gridley Model M Single Spindle Automatic.

Namco collapsible taps are famous for smooth, clean thread form, for fine fit and for uninterrupted precision tapping on long runs. That's the direct result of exclusive Namco design and construction features. Check these:

✓ **FEW PARTS**—Hardened and precision ground throughout, for less wear, easier replacement.

✓ **RIGID CONSTRUCTION**—Heavy core piece supports chaser full length; heavy body for side support.

✓ **QUICK, POSITIVE ACTION**—No lost motion, no drag because of trigger-like collapsing action at instant cut is finished.

✓ **FINE DIAMETRIC ADJUSTMENT**—is provided through simple adjustment of only one screw. Conversion for use on nonrevolving spindle machine merely by adding handle.

✓ **ECONOMICAL, LONG LIFE**—More regrinds per chaser, matched by minimum investment for heads: 8 tap sizes, from 1⅜" to 4" for adjustable blade chaser type; for circular chaser type, one body for 3" to 5".

For complete details on all Namco RST Collapsible Taps and Vers-O-Tool Self Opening Die Heads, ask for Catalog D-51.

The NATIONAL ACME CO.

170 EAST 131st STREET · CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

This roll looked perfect...

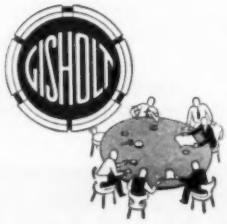
until SUPERFINISH revealed these defects!

Everybody said it was as perfect a finish as you'd ever see. A 12" steel roll ground down to a smoothness of less than 2 micro inches—dazzlingly reflective from end to end. Not a visible defect *—on the surface.*

But when SUPERFINISHING began, some interesting marks appeared—longitudinal flat spots—defects produced by the prior operation and then covered up by the heat of grinding.

SUPERFINISH brings these hidden troubles out in the open—out where you can see them and recognize the cause. And if your troubles are not too serious, SUPERFINISH can correct them economically and fast.

If you have fine finish requirements it will pay you to write for the booklet "Wear and Surface Finish."



THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Cut Costs

ON COLLET CHUCKS WITH UNIVERSAL'S SIMPLER DESIGN

Universal's collet chuck design with only three basic parts — nut, collet and chuck . . . means lower initial cost and less need for replacements because there are less wearing parts. This design not only saves money — it also provides wrap-around action, gripping on a continuous surface *the full length of the collet.* Drills can't slip, tool shanks don't get scored, tools run true and run-out is held at a minimum. Universal Collet Chucks are *available from stock* in collet sizes from 1/16" to 1½", to fit any screw machine. To cut chuck costs, write to the Universal warehouse nearest you . . . 1060 Broad Street, Newark, N. J., 5035 Sixth Ave., Kenosha, Wisc., or the home office.

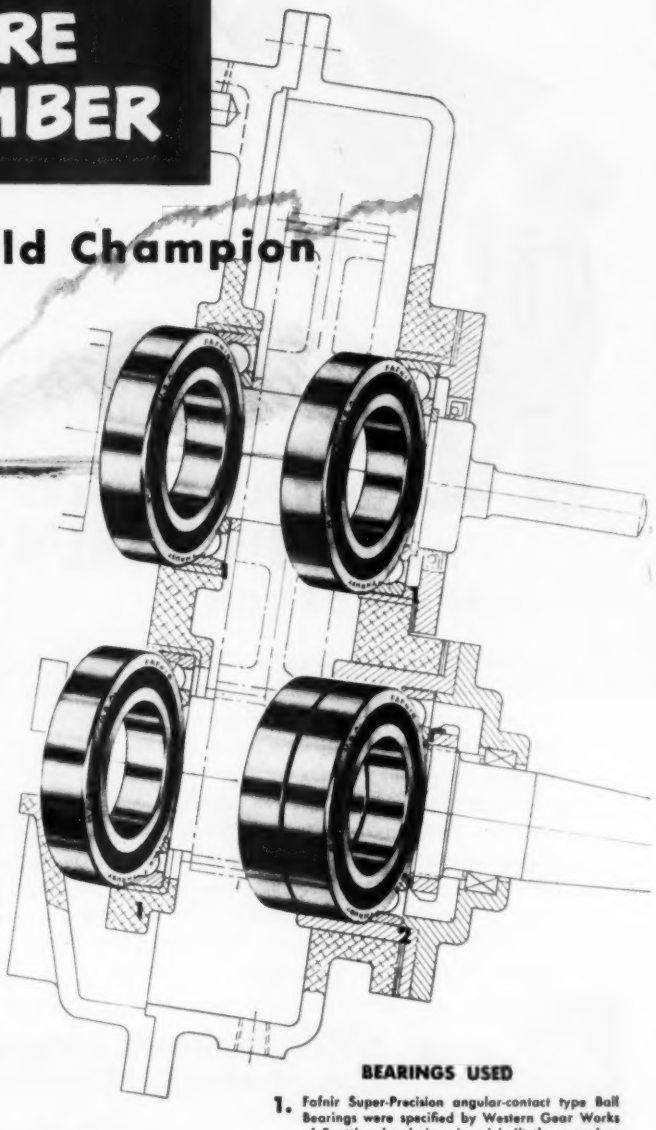
Exploded view of Universal Collet Chuck illustrating simplicity of design

UNIVERSAL ENGINEERING COMPANY

149 **FRANKENMUTH 1, MICHIGAN**

BEARING TORTURE CHAMBER

of a World Champion



in this spur gear box, the world's fastest boat, Stanley Sayres' "SLO-MO-SHUN IV", gets its amazing drive. The gear box uses 5 Fafnir Super-Precision Ball Bearings — as against 8 in competing boats.

Beside winning both the Gold Cup and Harmsworth Trophy Races in 1950, "SLO-MO-SHUN IV" set the world's straightaway record of 160.3 mph for a mile. The straightaway runs were made with a damaged drive shaft which made it unwise to use full throttle. Even so, the 3 to 1 step-up ratio turned the output (propeller) shaft at 11,100 R.P.M. and the tandem duplex bearing was taking a thrust load of over 4600 pounds.

Although you may not have bearing problems to match this one, you'll find it to your advantage to discuss them with a Fafnir representative because Fafnir's experience is not limited to just a few industries but is industry-wide. The Fafnir Bearing Company, New Britain, Conn.

BEARINGS USED

1. Fafnir Super-Precision angular-contact type Ball Bearings were specified by Western Gear Works of Seattle who designed and built the gear box for "SLO-MO-SHUN IV".

2. Similar to those above except these bearings are duplexed to provide greater axial and radial rigidity.

FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

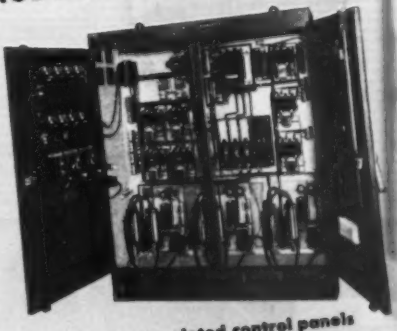
DESIGN LEADERSHIP

IN ELECTRICAL CONTROL FOR MASS PRODUCTION INDUSTRIES

A leading automobile manufacturer asked Square D to design and build magnetic and electronic control for a battery of 10 new multi-transformer welding presses. As many as 168 spot welds are made by one machine with 14 individually controlled timing periods in sequence.

Among the "must" requirements were:—welding current flow synchronized to prevent high starting transients and minimize stress on transformer windings; and a limitation of 1000 ampere current in each 3 phase line. Trouble-free performance on the production line has proven the successful solution by Square D engineers.

Engineering counsel on any electrical control problem is available through Square D field offices in all principal cities.



One of the completed control panels *Because Square D's line of control is so complete, this entire unit was designed using only standard devices, accessories and electronic sub-assemblies.*

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

ELECTRODES

cut welding costs all along the line

OPERATOR

"easy to use"

"I like G-E rods because they are easy to use—I can make more welds per day. And no matter what sort of welding work I have to do, ordinary or special, there's always a 'right' G-E rod for the job."

WELDING ENGINEER

"excellent mechanical properties"

"We can more than meet our specifications by using G-E electrodes. They have excellent mechanical properties—high tensile strength, good ductility, and soundness."

PLANT MANAGER

"for fast and economical production"

"Our plant aims for fast, economical and quality production. At the same time, we want to keep our operators happy with the tools we provide. We chose G-E electrodes because they do both jobs."

PURCHASING AGENT

"high quality product at right price"

"By using G-E electrodes we get a high quality product at the right price—and get it promptly. We can get prompt service right from our local distributor."

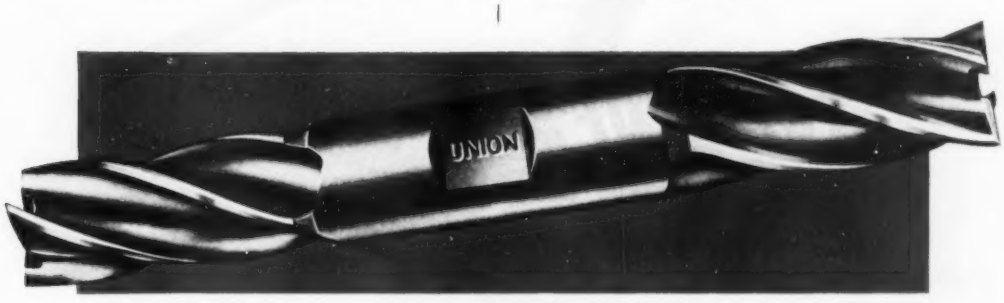
Order arc-welders, electrodes, accessories, and renewal parts from your G-E Welding Distributor. For more information, write: Apparatus Dept., General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

You cut costs as well as metal...

with UNION *end mills*

UNION DOUBLE-END END MILLS are available with four flutes—as illustrated—or two flutes, in standard or small-diameter sizes. All in high speed steel.



BUILT FOR MAXIMUM ECONOMY, Union end mills provide top performance throughout the range of end milling operations. Made of high speed steel, they have the smooth, free-cutting action that saves power, while their great strength reduces breakage to a new low. And all Union solid type end mills of ½" diameter or over have deep counterbores, considerably lengthening their resharpening life. In fact, as with all Union cutting tools, every detail of their design and construction is the result of up-to-the-minute tool engineering that saves you time, labor and money . . . *And that's worth specifying!*

THERE'S A TYPE OF UNION END MILL FOR EVERY PURPOSE

Taper Shank	**Single End**
Straight Shank	**Double End**
Shell	**Ball End**

Union is also prepared to make special types of end mills to your specifications.

no other end mill will outperform a UNION

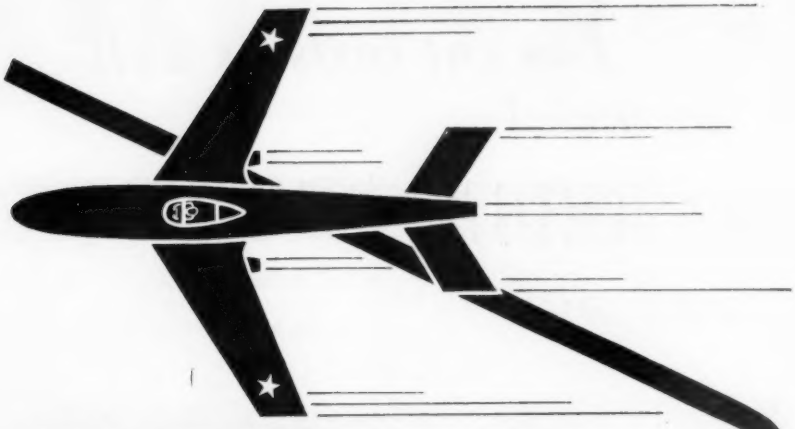
contact your local distributor

His name is listed in Union's THOMAS' REGISTER insert under "Drills, Twist."

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

Milling Cutters · Gear Cutters · Twist Drills · Hobs · Reamers · Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass. Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates.



TUF-STUF'S best proving ground is in the air!

It pays to specify *TUF-STUF* aluminum bronze alloys for parts that must stand up

● Because they are both light and tough, TUF-STUF aluminum bronze alloys have proven invaluable in America's aircraft as valve-seat inserts, spark plug inserts, valve guides, gears and other vital parts.

If your product requires machined parts that are strong but light, resistant to corrosion, long wearing and resistant to oxidation even at high temperatures, then TUF-STUF is the right alloy for the job.

TUF-STUF alloys are furnished in the form of forgings, rods and screw machine parts. They fill Federal Specification QQ-B-666, Grade B, and several other variations. Because of the increased use and demand for both aluminum and copper, jobs carrying a Defense Order Number are receiving first consideration.

MUELLER BRASS CO.

PORT HURON 18, MICHIGAN

61

"DURACUT ABRASIVE DISCS ARE TERRIFIC!"*

*This is typical of what hundreds of weld grinders and maintenance men are saying about these new flexible abrasive discs.

For use on portable disc sanders, DuraCut abrasive discs are 1/8" thick while the ordinary coated discs have but a single layer of abrasive. The extra cutting ability offers these startling advantages:

- **Greater economy.**
- **Longer life — 15 to 20 times.**
- **Faster, sustained rate of cut.**
- **Safe — strong — resist tearing.**
- **Increased labor savings — less disc changing.**
- **Available in a wide range of grits, grades and structures — permit control over rate of cut and finish.**

TYPICAL APPLICATIONS: Blending and finishing of steel, stainless and alloy steel welds . . . Removing rust and scale . . . Finishing sheet metal jobs . . . Cleaning weld spatters.

Order Today for a Trial.

Sizes available for immediate shipment . . .
7 x 1/8 x 7/8
9 x 1/8 x 7/8
} In any of these grit sizes: 36, 54, 80

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BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal Cities
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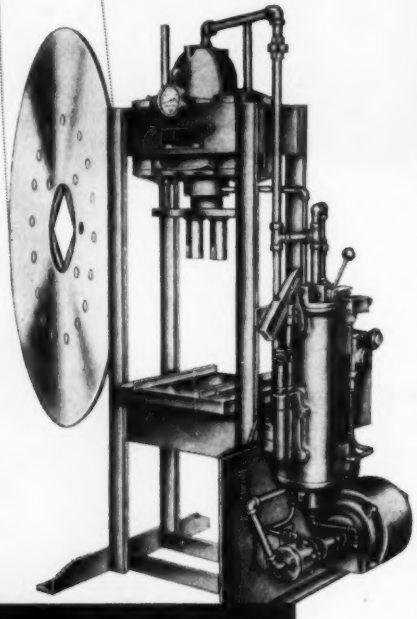
Top Performance Consistently Duplicated

K·R·WILSON goes bob-bob-bobbin along



KRW HYDRAULIC PRESSES DO UNUSUAL JOB FOR AMERICAN LACE INDUSTRY

Compressing 90-180 yards of lace thread on a bobbin 3/64" thick. That's the job KRW presses do for the American lace industry. Using a new bobbin pressure device, designed by our good customer, Kent County Machine Co., 480 bobbins are pressed at one time. The average lace machine has 4400 of these bobbins working at once, so it takes 9 precision set-ups to do a complete set. This new process is 8 times faster than older methods and over 80% of the lace thread used by the industry is now compressed this way on KRW presses. Each wound bobbin measures 1/32" thick . . . precision work with a capital KRW.

Any precision press problems in your operation? Check with KRW. We have a complete line of low-cost, money-saving Hydraulic presses. Capacities from 25-150 tons. Hand-operated, air-operated or motor driven. If you need a specially built press, we'll engineer one to your specifications.

Ask your Machinery dealer to quote prices.
Or write or wire Dept. 11.

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Here's Proof

The New Thompson Type 2F is a SUPER PRECISION Tool Room Grinder

WEBBER GAGE COMPANY
12900 TRISKETT ROAD · CLEVELAND 11, OHIO

November 10, 1950

Mr. Wilson, Vice President
Thompson Grinder Company
Springfield, Ohio

Dear Mr. Wilson:

We recently installed a new THOMPSON Tool Room Grinder to grind Gage Blocks to our specifications and tolerances. The results have been very satisfactory, in spite of the close limits to which the work has to be done. We thought you would be interested in the performance of this machine.

Very truly yours,
WEBBER GAGE COMPANY
George D. Webber

Thompson 2F Grinder Photographed in the Webber Gage Co., Cleveland Plant

COMPARE THIS NEW 8 x 10 x 24 TOOL ROOM GRINDER

When working to a tolerance of four millionths of an inch such as is observed when making Webber Gage Blocks, the rough or preliminary grinding plays an important role in keeping cost of the final finishing within reasonable limits.

Compare These Features:

- HARDENED AND GROUND cross slide ways completely sealed.
- One shot lubrication to cross slide ways and internal saddle bearings.
- HARDENED AND GROUND sealed anti-friction vertical slide.
- HARDENED AND GROUND BED WAYS with automatic lubrication.
- 3600/1800 R.P.M. 2 speed wheel head. Heavy alloy steel spindle heat treated, runs in super precision ball bearings accurately preloaded, lifetime lubricated.

Handy control panel.

- Elevation micrometer stop graduated in .0001".
- GROUND THREAD FEED SCREW.
- Automatic wheel TRUING device.
- Longitudinal hand wheel with automatic engagement.
- Hydraulic head movement throttle with rapid traverse.
- Hydraulic table movement throttle.
- Elevating hand wheel graduated in .0005".
- GROUND THREAD FEED SCREW.

WRITE TODAY for complete specifications and performance data. Address Dept. 10, Thompson Grinder Co., Springfield, Ohio.

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The only manufacturer of a complete range of heavy duty and light duty surface and contour grinders for industry.

Thompson SURFACE Grinders

The Thompson Grinder Company, Springfield, Ohio

For those tough *Special* jobs that just have to be right...depend on

NATIONAL TOOL CO.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

GEAR SHAPER CUTTER and HERRINGBONE GEAR CUTTER
custom-engineered to meet the exacting needs of the Gear Industry

A PARTIAL LIST OF *Special* TOOLS ENGINEERED AND MANUFACTURED BY

Gear Shaper Cutters	Milling Cutters	Chamfering Cutters
Herringbone Gear Cutters	Broaches	Rotary Gear Cutters
Ground and Unground Gear and Spline Hobs	Tungsten Carbide Tools	Circular Form Tools
Master Gears	Sprocket Cutters	Gang Cutters
	Profile Form Mills	Flat Form Tools

NATIONAL TOOL CO.
Cleveland 2, Ohio

Representatives in major industrial centers

New! Revolutionary!

Elmes PIPELESS

HYDRAULIC METAL-WORKING PRESSES

★ ***No high-pressure piping troubles***
★ ***Maintenance practically eliminated***

NOW, Elmes has engineered a *new kind* of hydraulic press designed to give you remarkably low-cost maintenance with practically no downtime! The main hydraulic circuit on these new-type Elmes Presses has *no piping. All high-pressure fluid is conducted through short, direct passages drilled in the structural parts.* There are no high-pressure screwed joints to loosen; no possibility of welded joints or fittings breaking loose or dripping oil. The only pipes in the entire unit are pilot, suction, and drain lines. Of these, only the pilot line carries high-pressure oil.

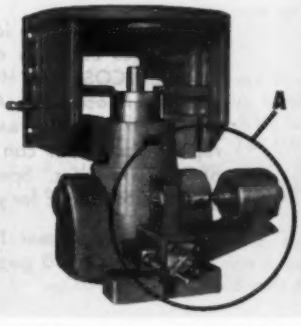
Press operation is smooth, decidedly quieter, with vibration virtually eliminated. Since fluid passages are short and direct, turbulence and oil heating are minimized. Reversal of ram is shockless. Response to electrical controls is prompt and precise.

Maintenance is easy and economical. Pumping unit and valve unit can be removed as single assemblies, without disconnecting any piping. Whenever desired, an advance design of pumping unit assembly can be mounted on the press, making it practically *obsolescence-proof!* No special motors or pumps are used, facilitating interchangeability.

Full details are now available. Call in an Elmes engineer. Let him show you the many production and maintenance advantages of these revolutionary new Elmes Pipeless Metal-Working Presses. Write *now* for new Bulletin 1011—"Elmes Pipeless Metal-Working Presses."

ELMES DRAWING & FORMING PRESS Equipped with new Pipeless Hydraulic Circuit. Any Elmes Metal-Working Press, standard or special design, can be supplied with the new pipeless construction.

Upper section of press, oil reservoir removed. "A" indicates valve unit assembly. This package unit contains provisions for cylinder prefilling, decompression, press speed change, and tonnage control.



Pumping Unit—front view. "A" indicates pipeless pilot unit. There is one pipe line for the suction line of the pilot pump. Pipe leaks are eliminated.

ELMES 100th Anniversary 1851-1951 HYDRAULIC EQUIPMENT

AMERICAN STEEL FOUNDRIES • ELMES ENGINEERING DIVISION
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Van Keuren WIRE TYPE PLUG GAGES

VAN KEUREN FULL 2" GAGE

AGD 1¼" GAGE

WHICH GAGE WILL YOU BUY?

CATALOG AND HANDBOOK No. 34

This 208-page volume represents 2 years of research sponsored by The Van Keuren Co. It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies are now free upon request.

Wire Type Plug Gages were originated by The Van Keuren Co. over 25 years ago. In 1948 this design was adopted in shorter lengths as the AGD standard for gaging holes from .030" to .510" diameter. The Van Keuren Co., because of years of pioneering, is able to offer the extra length at little or no extra cost.

You cannot afford to lose this extra length. When you need plug gages obtain a quotation from The Van Keuren Co.—Compare COST PER HOLE GAGED. You can be assured of quality and accuracy. A double inspection at the factory eliminates your inspection expense. No time will be lost waiting for replacements. You can count on prompt delivery from a stock of 2 million wires. Specify Van Keuren wire type gages and get the most GAGE for your GAGE DOLLAR.

Send for Supplement 19 showing quick and easy method of getting 4 to 10 gages from 1 VK wire type gage unit.

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CHROME PLATE **VK CARBOLOY**
FOR SUPERSERVICE **Phone Watertown 4-4394**

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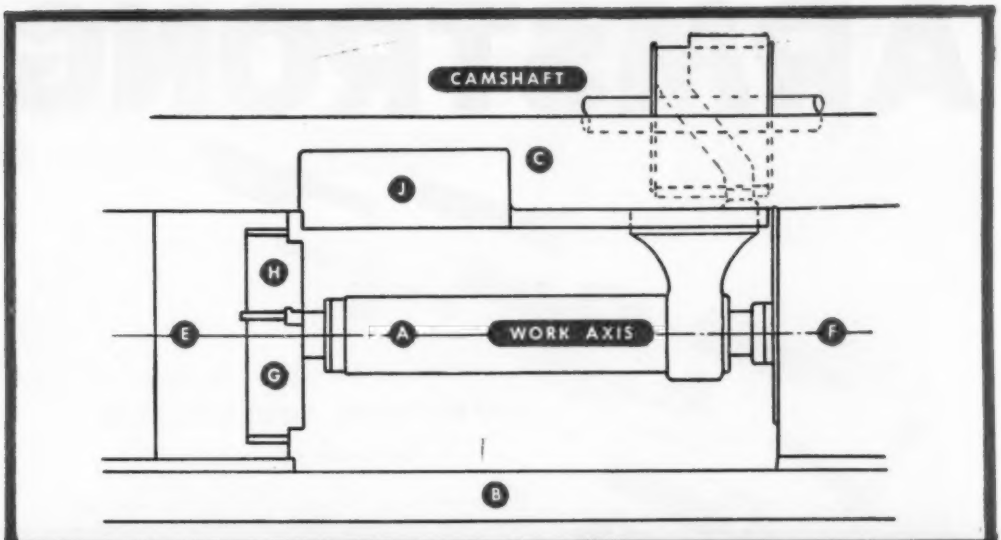
32nd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



THE *good* THAT MEN DO

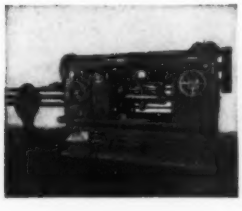
The horizontal design Tooling Area, shown above, is a contribution by Frank L. Cone to the improvement of the Multiple Spindle Automatic Bar Machine that will live long after him. The advantages, stated below, are made possible by the machine's Overhead Camshaft. Specific data invites comparison.

THE TOOLING AREA OF THE CONOMATIC (1½" Six Spindle):

1. **Handles longer work than can be handled by the tooling area of any other "automatic."** — *The length of the Tooling Area is 46⅝ ins., which permits standard machining operations on work up to 18 ins. in length from the face of the cut-off tool.*

2. **Is more strongly supported by the machine frame than is the tooling area of any other "automatic."** — *The stocky Uprights, E and F, which are shorter than those of other "automatics," are securely bolted to — and held between — the Top Bed, C, and Base, B,* which are larger and heavier than such members of other "automatics." *The Uprights are 22" high. The Top Bed is 8" high, 23" wide and 103¼" long. It weighs 1232 lbs. The Base is 33⅜" high, 46" wide and 110" long. It weighs 6655 lbs.*

3. **Provides more Tooling positions than does any other "automatic."** — *The Main End Slide, A, has 6 positions. The Main Cross Slides, G and H, front and rear, have 6, and the Auxiliary Cross Slide, J, front and rear, are 2 more, which make a total of 14.*



Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

ARMSTRONG

Modern Tooling Calls for *the Correct*

ARMSTRONG TOOL HOLDERS
for each operation

In the old days it was a matter of pride with toolmakers to be able to do the work at hand with the tools at hand. It's a credit to their skill that they could devise to cut threads, do cutting-off and facing, as well as many other operations with one ARMSTRONG TURNING TOOL, but, at today's labor cost, this would be an expensive practice. The maximum of productive work and true machining efficiency can only be obtained by providing the correct ARMSTRONG TOOL HOLDERS for each operation.

The Armstrong System of Tool Holders provides specially designed ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters, and shapers . . . Turning Tools, Boring Tools, Threading Tools, Knurling Tools, Cutting-Off Tools; tool holders with straight shanks, with off-set shanks, rigid tools and "spring" tools . . . special tool holders for high speed steel bits or blades, for ARMIDE (carbide-tipped) Cutters, for ARMALOY (cast alloy) Bits and Blades.

These modern efficient ARMSTRONG TOOL HOLDERS are as available as your telephone for they are carried in stock by your local ARMSTRONG Distributor.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

5215 W. ARMSTRONG AVENUE **CHICAGO 30, ILL.**

WHAT YARDSTICK DO YOU USE IN SELECTING GEARS?

On any basis of selection, Farrel-Sykes herringbone gears offer a number of advantages to designers and engineers responsible for the correct application and successful operation of gears. The quiet, vibration-free performance and long life you can expect from these gears result from extreme accuracy of tooth spacing, contour and helix angle...qualities inherent in the Farrel-Sykes method of gear generation.

The herringbone design provides a maximum number of gear teeth always in mesh. Overlap or interlacing of the teeth, together with gradual engagement, contribute to smooth operation. Opposed helices balance and absorb axial thrust within the gear member, eliminating harmful thrust loads and resultant stresses on other parts of the machine.

Farrel-Sykes herringbone gears are made of the finest grade materials, in a complete range of sizes for any power capacity and any application.

Farrel engineers are available to assist in working out unusual gear problems. Information about herringbone gears, or any of the other types mentioned on this page, will be sent on request.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y. • *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Los Angeles, Tulsa, Houston, New Orleans

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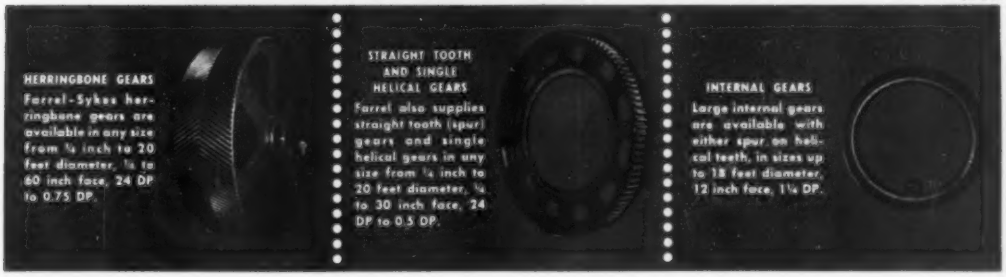
HERRINGBONE GEARS
Farrel-Sykes herringbone gears are available in any size from ¾ inch to 20 feet diameter, ½ to 60 inch face, 24 DP to 0.75 DP.
STRAIGHT TOOTH AND SINGLE HELICAL GEARS
Farrel also supplies straight tooth (spur) gears and single helical gears in any size from ½ inch to 20 feet diameter, ¾ to 30 inch face, 24 DP to 0.5 DP.
INTERNAL GEARS
Large internal gears are available with either spur or helical teeth, in sizes up to 18 feet diameter, 12 inch face, 1¼ DP.

Constant "STOPS AND STARTS" knock out ordinary gas trucks

Constant stop-start operation in industrial trucks means costly operation. Clutch, tires, engine, power transmission parts – and even the driver – are too quickly worn out. Replacement costs mount and trucks lose time on the job. There is *one way* to lick this problem – it's Fluid Drive, the famous cushioned power transmission used exclusively in the new YALE Fork Lift Gas Trucks!

Only YALE has FLUID DRIVE to solve Stop-and-Start problem

See how YALE Fluid Drive can save you money on all materials handling jobs. You get smooth stops, smooth starts, steady floating power at any speed . . . under a *full load* . . . on the level . . . on *steep ramps*. The clutch lasts 3 to 6 times longer. You can operate easily in close quarters – increase storage space, reduce load breakage and driver fatigue.

And only the new YALE can smooth out your materials handling with these other exclusive features

Heavy duty hypoid gearing! 65HP all-weather engine! Shockless steering! Automotive hydraulic brakes! Cold drawn precision aligned uprights! These parts – every vital part, in fact – have been selected, tested and *proved* for their ability to give you more work for your money. Let us show you exactly *how much more!* Write for all the facts today.

Capacities up to 10,000 pounds

YALE is the registered trademark of The Yale & Towne Manufacturing Co.

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☐ Please have your local representative call on me.

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MATERIALS HANDLING DIVISION
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THE YALE & TOWNE MANUFACTURING COMPANY

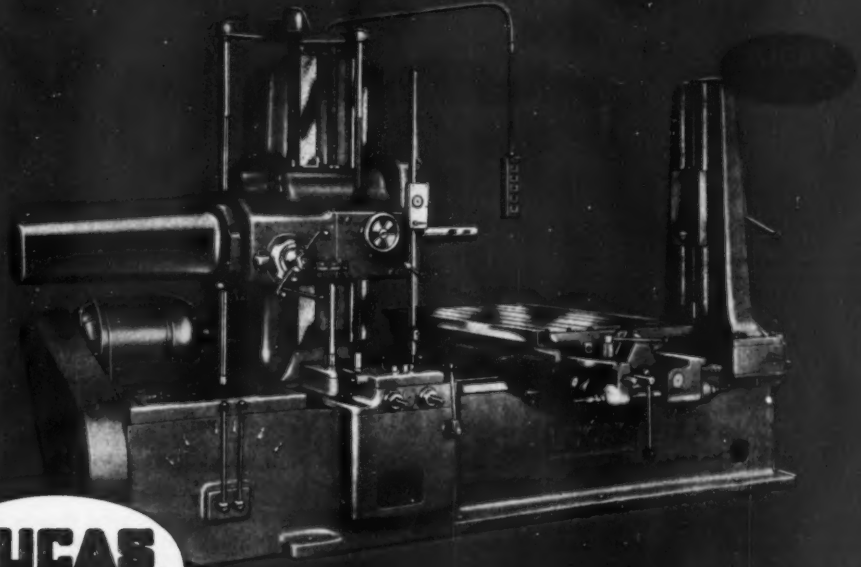
FIFTY-ONE YEARS ONE PRODUCT

and a *Better product* every year

For half a century we have concentrated on one thing . . . improving Lucas horizontal boring machines.

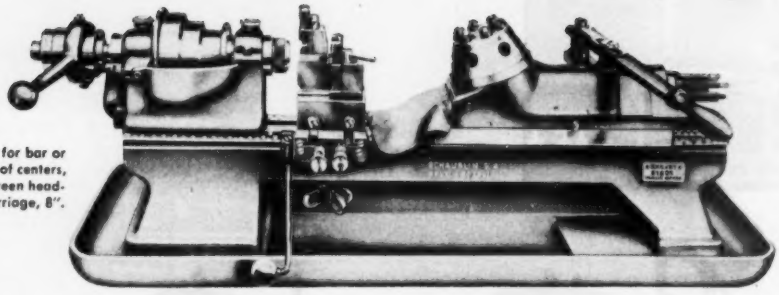
Through all these years the thousands of Lucas "Precision" horizontals in use throughout the metal-working industries have demonstrated their outstanding leadership as the Standard of Comparison for both extreme accuracy and top performance.

The recent improvements incorporated in the advanced design of today's Lucas machines is a guarantee that this leadership will be maintained.



LUCAS *Precision*

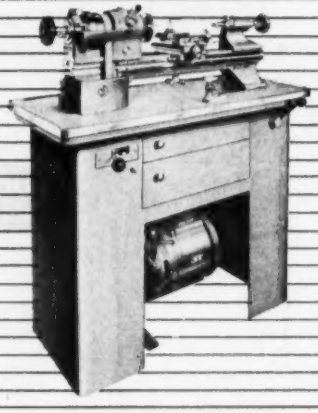
HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO



SV 70 Turret Lathe for bar or chuck work. Height of centers, 2.8". Distance between headstock and turret carriage, 8".

S C H A U B L I N

These SV Machines fully warrant your inquiry for complete information. They have contributed greatly toward winning for the Schaublin line a fine reputation for the adaptability and precision that are highly prized by toolmakers. Factory service, interchangeable units and accessories are available from American warehouses. Consult us on your tool-making problems.



SV 102 Toolmakers' Lathe for which great variety of independent and interchangeable units and accessories are available.

SV 12 High-Precision Milling Machine—one of five different types. Table sizes 4-23/32 X 16-1/2" to 10 X 43-5/16".

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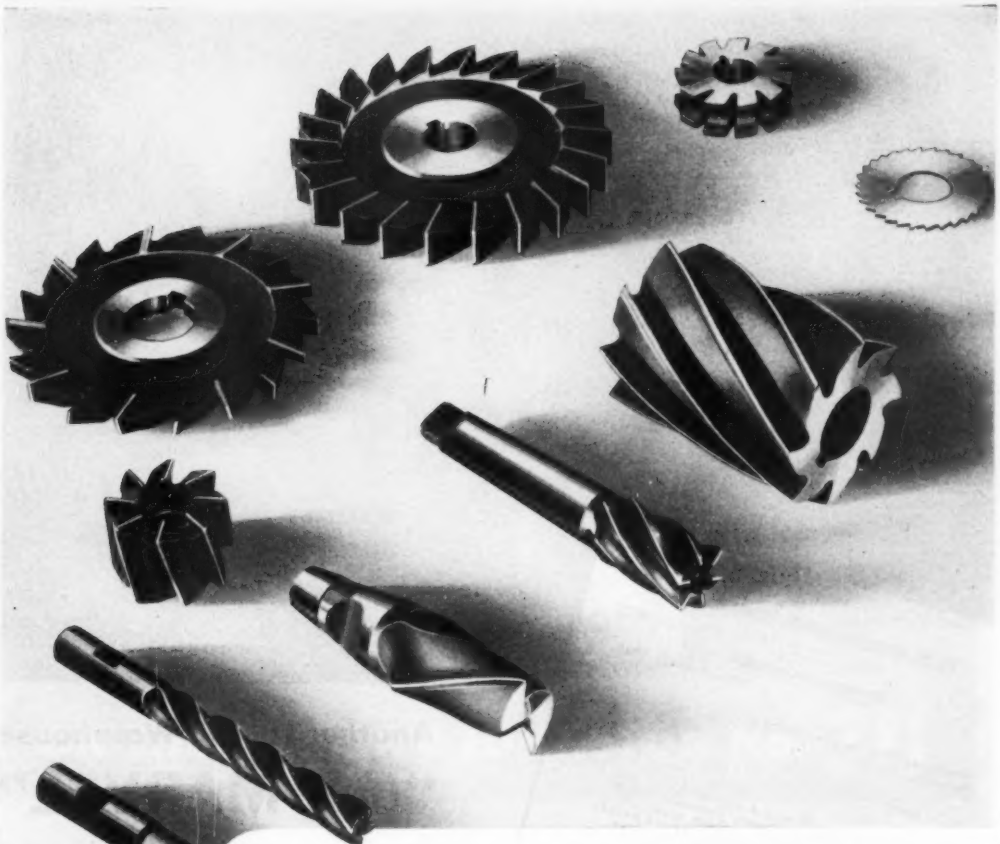
Representatives in Principal Cities

EXCLUSIVE U.S. AGENTS FOR TORNOS WORKS, LTD.; SCHAUBLIN, S.A.; LAMBERT, S.A.; SAFAG, S.A.; AND AGATHON, LTD.

At 30 Park Avenue, Manhasset, N. Y., is the widest selection of Swiss precision machine tools available from any one address in the United States. Offered here by Carl Hirschmann Co. are Tornos Screw Machines and Cam Making Machinery; Schaublin Lathes, Collets, Milling Machines and Drilling and Tapping Machines; Lambert Gear Generating Machines and Thread Cutting Machines; Safag Automatics for Wheel and Pinion Cutting, Form Cutter Milling, and Cutter Backing Off; and Agathon Grinders and Die Sets. Offered by Hauser Machine Tool Corp. are Hauser Jig Borers, Jig Grinders, Optical Measuring Machines, Profile Projectors and Burnishing Machines.

SWISS *PRECISION CRAFTSMANSHIP* **SWISS** *DEPENDABILITY ACCURACY*



You Can Select Faster, More Efficient PRODUCTION

from the broader range of Brown & Sharpe Cutters

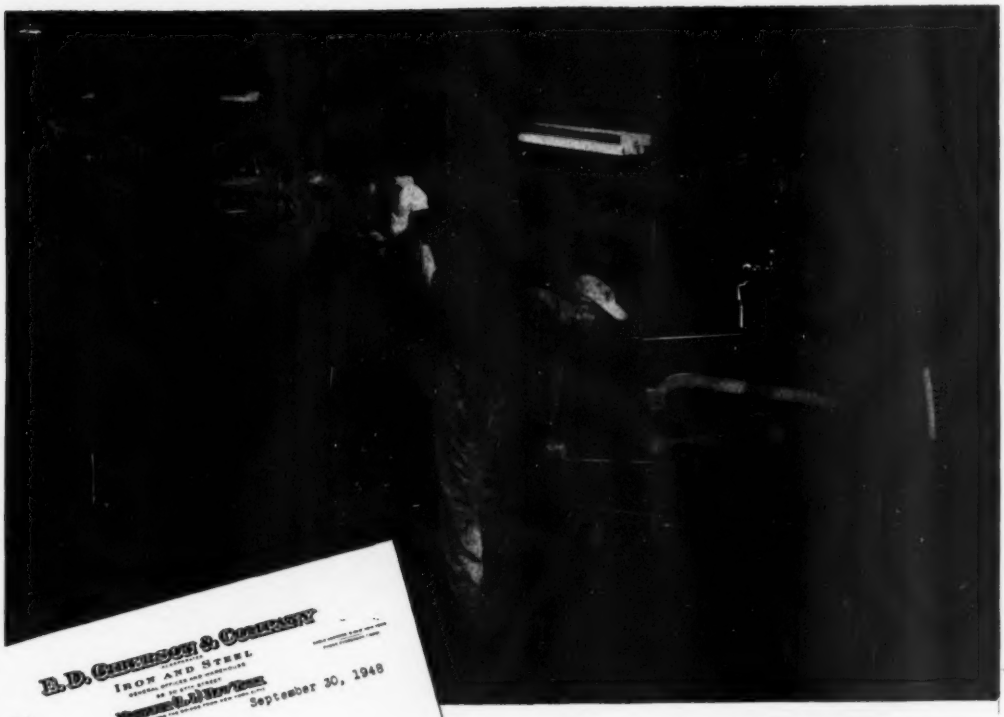
The closer you match your cutters to each job, the faster, more efficiently they will cut . . . and the less power it will take.

Brown & Sharpe offers a complete range of cutters that permits accurate selection of exactly the right cutter for each cutting job! Styles include every type from plain milling cutters and end mills to metal slitting saws and cutters for special uses. And every cutter is a *quality* product . . . designed and produced to fulfill the enduring accuracy that is built into today's milling machines.

Whenever you order cutters, specify Brown & Sharpe and be sure of getting maximum cutter productivity. Write for complete catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe BS



E. D. GIBERSON & COMPANY
IRON AND STEEL

September 30, 1948

Armstrong-Blum Manufacturing Co.,
Chicago, Illinois

Gentlemen:

For almost half a century as direct distributors of Boiler Tubes, Condenser Tubes in seamless steel, electric welded steel and stainless steel, as well as seamless and welded Mechanical Steel Tubing, as seamless Steel Pipe, Stainless Steel Pipe and Tubing, we have cut in our warehouse many million feet of Tubular Steel Products.

The nature of our business necessitates both speed and accuracy in multiple cutting to exact lengths required by customers. When we decided recently to install three more 9A MARVEL Heavy Duty Automatic Hack Saw Machines, it was with full knowledge of their efficiency.

We can assure you of our entire satisfaction with their operation and regard them as valuable additions to our equipment.

Yours very truly,
E. D. GIBERSON & COMPANY, INC.
E D Giberson
President

Another Tubing Warehouse

"Goes MARVEL"

Warehouses that are not equipped with proper sawing machines find that the cutting of steel tubing (especially the stainless types) is a difficult and costly job. But E. D. Giberson & Company, New York, have cut off millions of feet of all types and sizes of steel tubing to accurate lengths, economically and without difficulty, due to the fact that they have long been properly equipped with MARVEL SAWS. And because they have found MARVEL SAWS so trouble-free, so reliable, so economical to operate and so universally suited to all their cutting-off jobs, they have recently added this row of three new MARVEL No. 9A Automatic Hack Saws. With this additional equipment, they have expanded their facilities and can more promptly serve their fast-growing list of satisfied customers with steel tubing of all types and sizes, "cut to customer's specified lengths."

The local MARVEL Field Engineer will be glad to study your range of cutting-off work—whether it be in pipe, structural shapes, bars, or the toughest and largest alloy billets—and will then make recommendations on how you can improve your cutting-off operations to reduce costs and increase man-hour output.

Just write us on your letterhead: "Without cost or obligation on our part, send your local Field Engineer to look over our cutting-off operations."

Metal Cutting
MARVEL SAWS
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. COMPANY

5700 WEST BLOOMINGDALE AVENUE **"The Hack Saw People"** **CHICAGO 30, ILLINOIS**

You Can STEP UP Production

ALL PRECISION MACHINING ON THIS FLYWHEEL, AS INDICATED BY THE HEAVY LINES IN THE DRAWING,

— INCLUDING THREADING

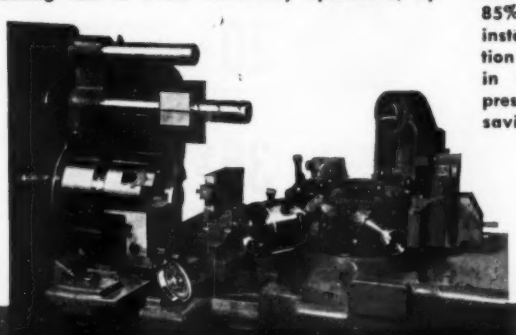
PLUS GENERATING THE 1" RAD. ON THE O. D. WITH SINGLE POINT SLIDE TOOL

ARE COMPLETED AT THE PRODUCTIVE RATE OF

50 PIECES PER HOUR

ON THE POTTER & JOHNSTON No. 3U

When you're swamped with demands for stepped-up production on forgings and castings up to 6" in diameter, you can rely on the 3U to turn out the work faster, better, and with fewer rejects. The 3U does it by combining cuts to avoid secondary operations, by effectively reducing machining times, and by eliminating all unnecessary work handling. Set up for your jobs with experience-engineered P&J Tooling, the 3U is the ideal machine for this class of work — as illustrated by the above production record based on 85% efficiency. That's why it's to your advantage to install modern P&J Automatics either on new production or as replacements for tired, slow equipment now in use. Send your multiple-operation problems, present or anticipated, to P&J for productive, time-saving Tooling recommendations.



3U *Speed-flex* AUTOMATIC

POTTER & JOHNSTON CO.

PAWTUCKET, R. I.

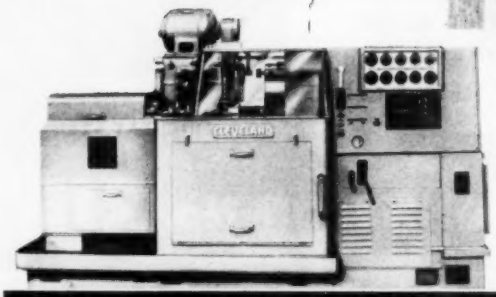
subsidiary of PRATT & WHITNEY Division Niles-Bement-Pond Company

P&J

HERE'S HOW PRODUCTION WENT UP...WHEN A NEW CLEVELAND *DIALMATIC* WENT IN!

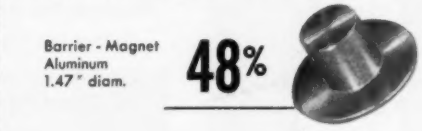
Eclipse-Pioneer Division, Bendix Aviation Corporation, blanks these parts on a new 2½" Dialmatic Cleveland.

they report these increases in production



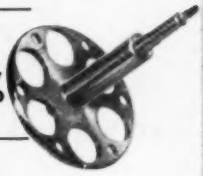
Model AB Dialmatic Cleveland 2½" Single Spindle Automatic (Also supplied in 3" capacity)

Barrier - Magnet Aluminum 1.47" diam. **48%**



17% Nut Blank E-8740 Steel 2⅛" diam.

Rotor Shaft Stainless Steel 1.46" diam. **33%**



71% Adapter Aluminum 1.92" diam.

End Cap Aluminum 1.95" diam. **157%**

30% Bellows Bottom Clamp, Brass 1.45" diam.

Clamp Ring Aluminum 1.81" diam. **35%**

And these are typical—not unusual—production increases. *Many* manufacturers have stepped up productivity by replacing prewar automatics and turret lathes with new Dialmatic Clevelands. How much will *your* production benefit? Let a Cleveland Engineer show you. Send us samples or part prints. There is no obligation, of course.

Remember . . . *Clevelands Cut Costs*

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Townsend

Saves Customer $12,000 In One Year With This Cold Headed Part

There may be several parts you are now using that Townsend can produce for you by cold-heading at substantial savings just as we did for a mid-west washing machine manufacturer. Originally the wringer spring rod shown above cost them $33.40 per thousand. Then a Townsend engineer suggested a change in design which eliminated one complete step in the manufacturing operation. This simple change reduced the cost to $20.95 per thousand—a clear savings of $12.45 per thousand. On an annual basis they save more than $12,000 on this part alone.

Savings like this are not unusual with Townsend customers—this is a typical example —some manufacturers save even more. Such economy is a reflection of the size and experience of the Townsend organization and demonstrates the possibilities for savings even on simple items.

Townsend makes 60 million items every working day by cold-heading and extruding—then they may be pointed, machined, drilled, slotted, trimmed, threaded, pierced, knurled, bent, or flattened. We make parts of carbon steel, alloy steels, bronze, copper, monel and aluminum. These are supplied in a variety of platings and finishes. If you want to learn more about the economy of cold-heading by Townsend ask to have one of our engineers call.

Townsend

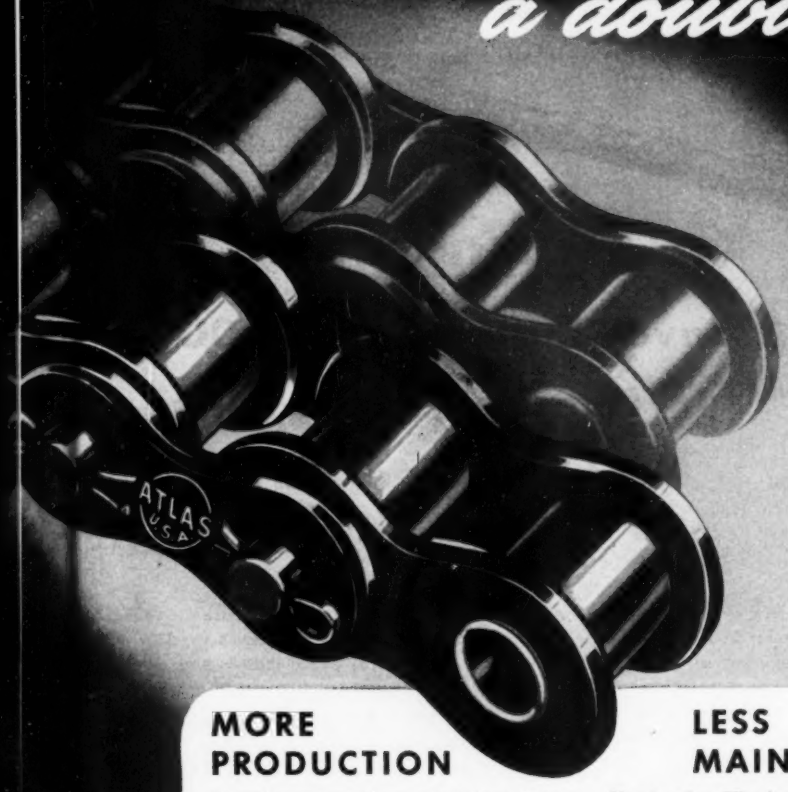
COMPANY • ESTABLISHED 1816

Plants—New Brighton, Pa. • Chicago 38, Ill.

Division Sales Offices—Philadelphia, Detroit, Chicago

Sales Offices in Principal Cities

CHAIN THAT LEADS *a double life!*



MORE PRODUCTION

Boosting output of present drives! Atlas Roller Chain is bringing this benefit to plants everywhere.

That's because Atlas Roller Chain provides a positive sprocket grip which makes possible the delivery of full rated horsepower without slippage or friction.

This means that your machines can run at full rated speeds and give greater output . . . with Atlas on the drive.

LESS MAINTENANCE

Here's why: The bushings and pins are case hardened by the Atlas Nicarb Process which provides greater inherent strength. Link plates and rollers are also made of tough, heat-treated alloy steel.

This means better chain performance . . . less chain maintenance.

For maximum production plus long, trouble-free service, install Atlas Roller Chain! Write today for the new Atlas Catalog and Handbook No. 51-AM.

ATLAS CHAIN & MANUFACTURING CO.
PHILADELPHIA 24, PENNA.

ATLAS

ATLAS ROLLER CHAIN

GREENLEE

AUTOMATIC TRANSFER MACHINE

VIEW FROM LOADING END

PERFORMS 120 OPERATIONS

STATION 1	
Load and Turn Over 180 Degrees	
LEFT HAND UNITS	RIGHT HAND UNITS
STATION 2	
Drill 12 Holes	Drill 14 Holes
Drill & Chamfer 2 Holes	
STATION 3	
Drill 7 Holes	Drill 10 Holes
STATION 4	
Drill 3 Holes	Drill 2 Holes
C'Bore & Chamfer 1 Hole	11" Deep
Ream 2 Holes	
STATION 5	
Drill 4 Holes	Drill 1 Hole
Ream 2 Holes	Ream 2 Holes
Chamfer 11 Holes	Chamfer 16 Holes
STATION 6	
Tap 14 Holes	Tap 17 Holes
STATION 7	
Unload	
58 OPERATIONS	62 OPERATIONS
TOTAL — 120 OPERATIONS	

FOR PROCESSING CYLINDER BLOCKS

PRODUCES 45 BLOCKS PER HOUR . . . AT 80% EFFICIENCY

This 7-station automatic transfer machine performs a total of 120 individual drilling, chamfering, counterboring, reaming, and tapping operations in a continuous cycle on cylinder blocks for a leading automobile manufacturer. The loading end of the machine is equipped with a turnover fixture that revolves the work 180 degrees, eliminating handling of the piece as it is received from previous machining operations.

Greenlee patented precision-ground individual lead screw spindles tap a total of 31 holes in both ends of the cylinder blocks. All tapping units are provided with a rapid approach and return stroke. Automatic tap lubrication insures clean, precision-cut threads with maximum tool life.

The electrically-controlled hydraulic units are easily accessible for set-ups and for making tool changes, and are designed so they can be independently operated. Ample room is provided between stations for work inspection. Automatic lubrication of each vital moving part assures long machine life and efficient operation.

The experience of Greenlee engineers and the skill of Greenlee manufacturing personnel were combined to produce this machine. The effectiveness of this Greenlee team can be used by you, too, toward the licking of *your* production machinery problems.

PRODUCTION MACHINERY
GREENLEE

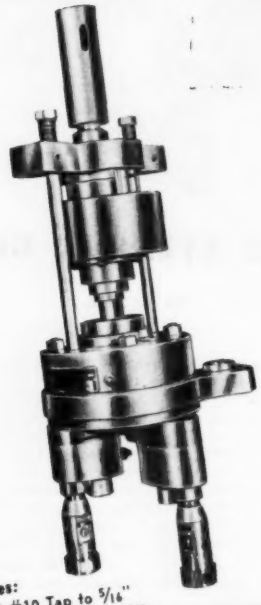
Additional Information Available Upon Request

GREENLEE BROS. & CO., 1723 Mason Ave., Rockford, Ill.
DETROIT OFFICE: CURTIS BUILDING, DETROIT 2, MICHIGAN

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

THE RIGHT COMBINATION TO CUT DRILLING AND TAPPING COSTS

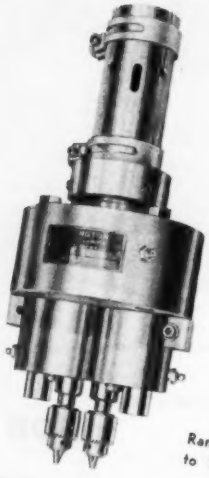
ERRINGTON *Adjustable* TAPPING HEAD



Sizes:
#0-#10 Tap to 5/16"
#1-3/16" Tap to 1/2"

Write for Complete Information

ERRINGTON *Adjustable* DRILLING HEAD



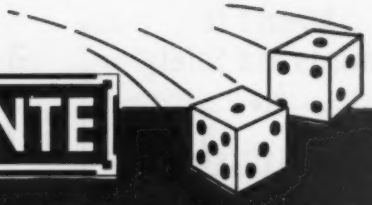
Range from 0 to 1½" drills

Here are versatile tools which permit you to take advantage of a wide range of adjustment—without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

Features: Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case. All parts fully enclosed for pressure lubrication and protection. Non-slip positive clamping on all adjusting members.

ERRINGTON **MECHANICAL LABORATORY, Inc.**
Established 1891
Main Office and Plant: **STATEN ISLAND 4, NEW YORK**

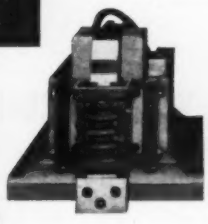
LAPOINTE

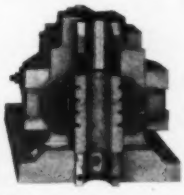


removes the problems from your

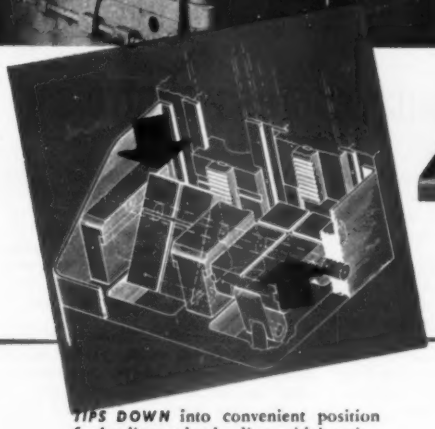
BROACHING FIXTURE

Don't take a chance on poorly designed or poorly built fixtures! The odds are *all against you,* and you'll end up with substantial money losses resulting from serious production headaches.





Photos show the broaching of Main Bearing Caps (joint face and half round) at a speed of 100 or more clusters per hour . . . 5 bearings to a cluster. Machine: Heavy-duty LAPOINTE Double Ram Vertical BROACHING MACHINE, 25-ton, 78" stroke. Cutting speed 40 f.p.m.



TIPS DOWN into convenient position for loading and unloading, with locating points in clear view of operator for fast part handling.

TIPS UP for broaching, with sturdy, rigid support locked securely against hardened and ground stops on both sides of trunion blocks.

LAPOINTE takes the responsibility for the entire job: machines, tools and fixtures.

LAPOINTE TIP-DOWN FIXTURES have become the *accepted standard.* Here's why:

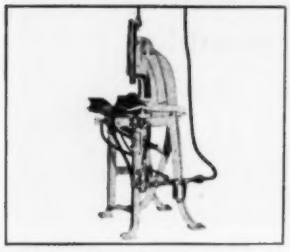
1. Accurate, fast, versatile — they will handle 80% of all surface-broaching requirements.
2. Convenient to load — eliminate fatigue. They bring the work holder out front, *where the operator can see it and get at it.*
3. Safe to operate.
4. Permit use of a great variety of work holders that can be manually or hydraulically clamped.
5. Allow use of fully adjustable work holders to compensate for broach wear.
6. Utilize full stroke of machine.
7. Sturdy and rugged.

THE *Lapointe* MACHINE TOOL COMPANY

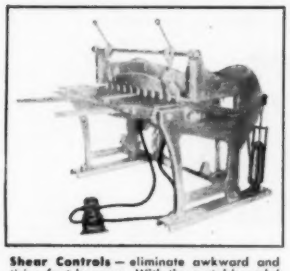
HUDSON, MASS.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING

Airways to Savings and Safety via Schrader®



Kick Press Controls—substitute more efficient air power for foot power—thus eliminating fatigue, spoiled work. Work is more uniform and is delivered at an increased rate. There is a Schrader pneumatic control for hand operation, foot operation or both.



Shear Controls — eliminate awkward and tiring foot leverage. With the portable pedal one man can now position the work and operate the shear. Extra force enables one man to shear heavier gauge metals and increase production.

Air Ejection Sets—Remove parts from the die by an intermittent blast of air. Can be timed to deliver a blast of air from a fraction of a second to any desired length during or after the cycle.

In addition to the above Controls, Schrader can furnish a pneumatic control to fit most any requirement.

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

a BIGGER, BETTER and SAFER day's work...

with pneumatic press controls

One of the easiest ways to keep hands out of the danger zone of power presses is to add an easy-to-install Schrader Hand-Operated Press Control. It is definitely a two-hand device.

A special cutout valve eliminates the possibility of either intentional or accidental one-hand operation that would defeat the purpose of the control. The hands that feed the die also operate the hand levers, which are located outside the danger zone. The foot pedal is eliminated entirely. No effort is necessary to operate the hand levers . . . a light touch does the work.

The greater safety possible with this control gives operators more confidence in their machines, results in more and better work. After a few hours of operation with this control a rhythm is acquired that will give new speed to your operators . . . a rhythm that is impossible with fatiguing foot pedal operation and the fear of the hazards involved.

Women operators especially like this safer, easier operation. Note the illustration above—see how the operator works in a comfortable position, more like operating a typewriter than a power press.

Look over the machines in your shop. You'll see many places where Schrader Controls can be *your* "watchdog" against power press accidents.

The sets come in packaged units with complete instructions for assembling. They are easy to install and maintain. Ask us to help you determine what will best fit your needs. Send us a letter outlining your particular installation, your idea, or fill out the coupon below.

Mail this Coupon Today

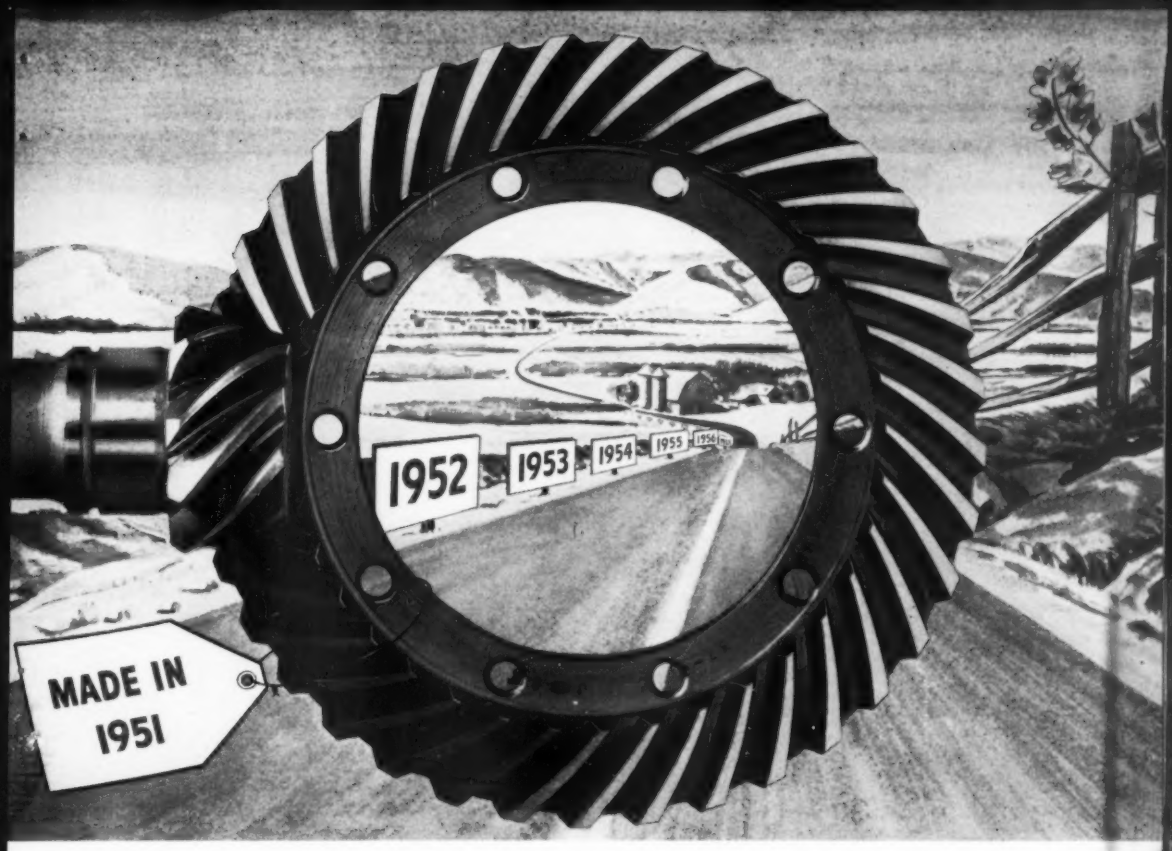
Schrader
PRODUCTS
CONTROL THE AIR

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn, N. Y., Dept. F-1

Please send me further information on

☐ Power Press Controls ☐ Kick Press Controls
☐ Air Ejection ☐ Shear Controls

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____



Here's the Way to Look at Gears

GEARS are not simply today's expense. They can be *tomorrow's* investment provided they are built to produce *low installed cost*—provided they serve *economically* and *dependably* on the job for which you buy them—provided they do credit to *your product* and *your reputation*. Gears of that character offer value and savings out of all proportion to their original cost.

"Double Diamond" Gears have been built to those standards for more than 36 years. Proof that they do deliver "long-term investment" value is found in the large number of companies who have used Automotive Gear as their principal gear source for many, many years. The manufacturer who, for instance, has been installing "Double Diamonds" in his product since 1932 knows from his own experience and from his own cost and service records that "Double Diamonds" are a consistent *plus* in the performance of his product and in the satisfaction of his customers.

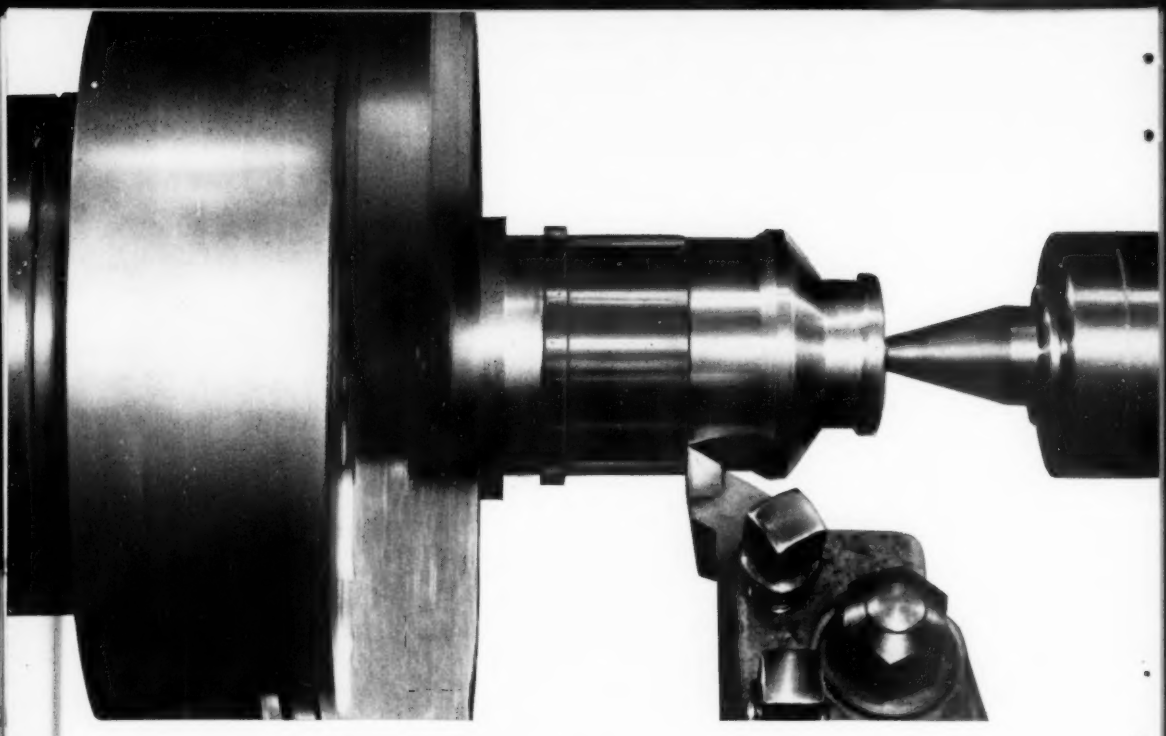
If you agree that gear-buying should be looked at in this way, write for more specific information. Your inquiry will receive prompt, efficient attention.

DOUBLE DIAMOND
TRADE MARK
GEARS

Automotive Gear Works, Inc.
RICHMOND, INDIANA

• • • • • • FOR AUTOMOTIVE FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS • • • • •

*Reg. U. S. Pat. Off.



How To Set Up a Cost Cut

By Cutting Costs... by Increasing Production... Modern Turning Equipment Can Literally Turn Red Ink To Black

In thousands of turning operations, American business is today burdening itself with needless cost. That's the high price of obsolescence—a "hidden tax," so to speak, levied on the efficiency and economy of our industries.

This "hidden tax" is the all-important consideration that we bear in mind in creating modern Monarch Lathes. THEY MUST DO BETTER WORK FASTER! And as these typical examples prove, they do! One customer reports a savings in labor costs, for the first year only, amounting to 49½% of his lathe cost. Another, a reduction in tooling costs on one job from $4220 to $187—along with a cut in setup time from 28 hours to 46 minutes. Big reductions in spoilage are reported consistently, and so are reductions in subsequent grinding operations—some up to 50%.

Don't these random instances suggest strongly that *you* take a new "Costs-Eye" view of turning? Study the cost-facts of your turning operations. Then ask a Monarch representative to review your findings. If better turning is the answer to your problems, Monarch has that answer now . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Monarch "Series 60" Engine Lathe, with Air-Gage Tracer Packaged Unit Controls—an automatic cycle machine convertible to and from normal lathe operation in a matter of seconds. Monarch has built fine lathes since 1909—3 types of tracer controls beginning in 1930.

Monarch

ACCURACY • ECONOMY • LONG LIFE

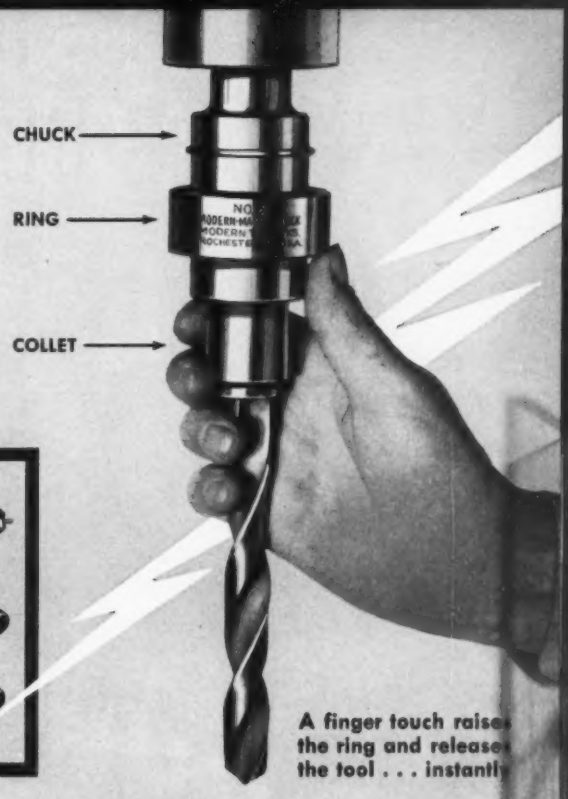
TURNING MACHINES

FOR A GOOD TURN FASTER TURN TO MONARCH

Speed up your production

Change tools without stopping . . . or even slowing the machine

MODERN-MAGIC QUICK CHANGE CHUCK and COLLET EQUIPMENT



Modern Precision Tools Include . . . . .

- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly lost time of revolving spindle machines. Used with such machines, tools are changed without stopping or even slowing the spindle. Changes are made from drill to reamer to tap instantaneously and safely while the machine is running at cutting speed. In this way, the Modern-Magic Chuck and Collet Equipment gives multiple spindle range to single spindle machines, increasing production and cutting cost. In high production shops, it has been proved they save time even though used only for changing from dull to sharp tools.

For full information, send for Bulletin M-103. In addition to standard Modern-Magic Chucks and Collets, it shows special types of each.

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

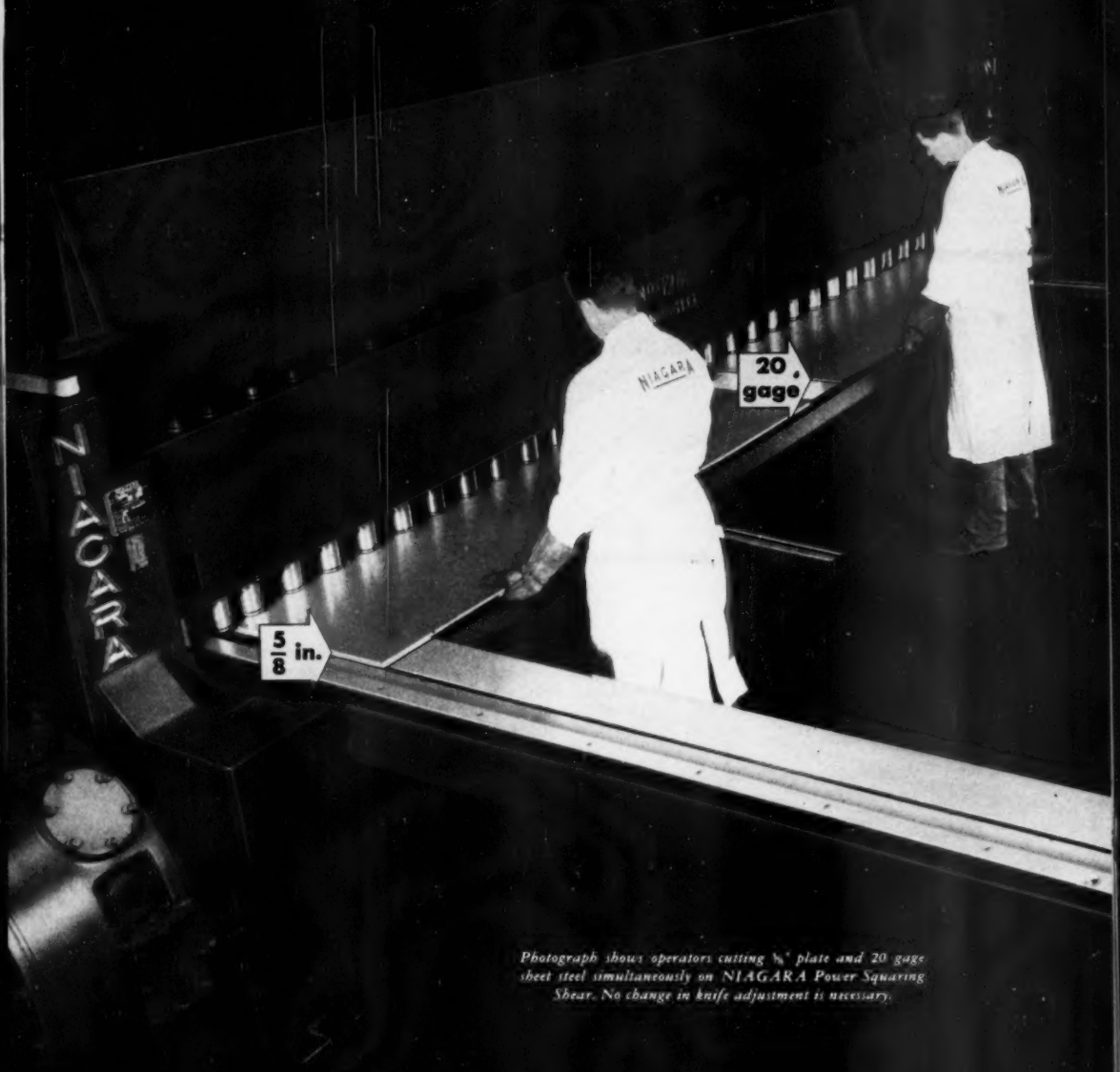
MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

CUTTING 20 GAGE and 5/8" PLATE SIDE-BY-SIDE AT ONE STROKE



Photograph shows operators cutting ⅝" plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration. Visitors at our plant can see this done every day. There is no necessity for tinkering with the knife adjustment.

Demonstrates The Sound Engineering Design of

NIAGARA

POWER SQUARING SHEARS

● There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

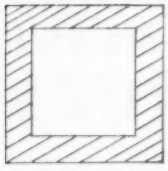
Accurate cutting depends primarily on rigidity of the shear's components.

For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

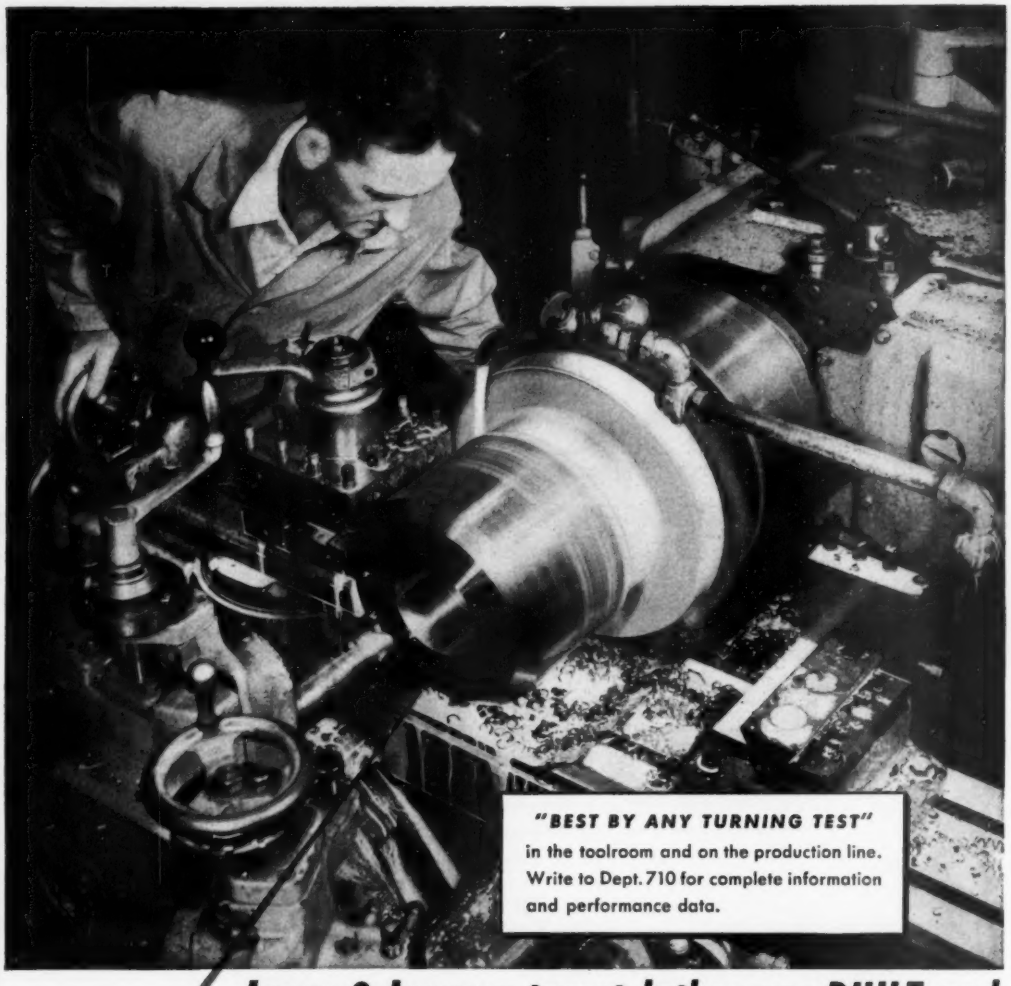
The economy of quality is remembered long after price is forgotten.



BED, CROSSHEAD & HOLDDOWN DESIGN

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line.
Write to Dept. 710 for complete information
and performance data.

Jones & Lamson turret lathes are BUILT and

POWERED TO PRODUCE

MORE CHIPS **per tool**

MORE PIECES **per hour**

MORE PROFIT **per job . . . than any turret lathe of comparable size!**

Turret Lathe Division **JONES & LAMSON** MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

sound *Investment*

This user gets more production per dollar invested, by replacing old type equipment with a modern SUPER SERVICE Radial.

Operators and maintenance men alike find no trouble in keeping this SUPER SERVICE Radial Drill at peak efficiency.

Leading manufacturers realize that the SUPER SERVICE Radial will produce the required results on large or small parts alike.

At the Norwood Works of the Allis-Chalmers Manufacturing Company, this Cincinnati Bickford 13" diameter column SUPER SERVICE Radial is drilling mounting holes in open slot stator cores. Table extension base on this machine readily facilitates the processing of small work. The head is merely positioned over the table for the small work, or swung over the base for the larger parts. From the eighteen feeds and thirty-six speeds, the right combination is always available for the drilling, tapping, reaming or boring tool involved. Write for Booklet R-29, which will give you more detailed information as to why the SUPER SERVICE Radial commands the respect and admiration of both shop and management.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

Radials 7½" dia. col., 2½" arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28"
Jig Borers, Portable Horizontals,
Spacing Table Machines

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**

"Keep cool everybody! Emil has a grip like a ***JACOBS CHUCK!"***

IF IT'S A

JACOBS

IT HOLDS

THE JACOBS MANUFACTURING CO., WEST HARTFORD 10, CONN.

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Upside-Down Drill

With reference to your note in AMERICAN MACHINIST, Nov. 13, 1950, I should like to mention that Messrs. R. Krause, Vienna, developed about 1935 fine-boring machines, in particular for the motor industry, in which the drill operates from below. This firm was a pioneer firm in vertical fine-boring machines of very heavy design. When the commercial manager of this firm hit on the idea to convert the drilling, a much lighter and simpler machine could be produced.

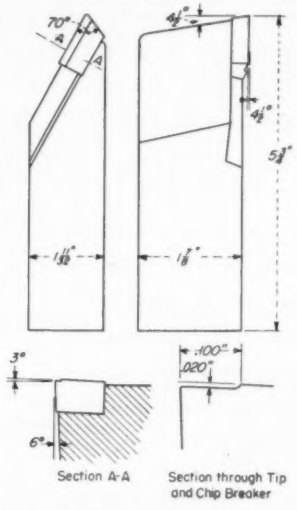
Paul Grodzinski
London, England

High-Speed Turning

The letter from John A. Pitt of Worcester, England (*AM*, Feb. 19, p112) leads us to make the following comments, based on our experience in high-speed turning:

1. The maximum in rigidity in machine and tool is necessary. We would use tools of larger shank as well as tip dimensions.
2. The hardest grades of carbides clamped to the shank seem to perform better than brazed-on tips.
3. A 0° to 3° negative rake on the breaker assures greater tool life.
4. We prefer air blast to coolant.

K. T. Kuck
Vice President, Engrg., Monarch Machine Tool Co. Sidney, Ohio



Mr. Pitt's test tool

The answer to Mr. Pitt's fundamental question is, "Yes!" I discussed his test with our George Morin (chief sales engineer) and we are in agreement on the following comments:

Mr. Pitt's test should not have been run dry. We would recommend two high-velocity streams of coolant, one directed at the top cutting edge of the tool and the other at the cutting edge from below the tool. We are also in agreement with you on the speed being too high as a starting point at any rate. The material used would have a machinability rating of about 55% of SAE 1112, and it would seem 900 to 1000 sfpm would be a good place to start.

We would suggest the following angles in conjunction with high-speed turning. Front and side clearance angles 7 to 9°, and a 3 to 7° negative top side and back rakes. The chip breaker looks all right. Not being acquainted with the George Fischer copying lathe, the only comment we can make on the 70° included angle of the tool is that the angle should be as large as the entrance angle of the machine will permit.

Walden F. Sinawski
Supervisor of Methods, Jones & Lamson Machine Co. Springfield, Vermont

Don't Dimple; Wiggle

First, I'd like to correct the wording of my article in *Practical Ideas* on making precise punches (*AM* Jan 8, '51, p 117). The second sentence at the top of the second column should read, "The same wheel that ground the die sections also ground the form cutters which milled the punches." Perhaps I was not clear in my original explanation. However, this should take care of any "Backlash" comments on the article.

.0001" in six inches

PLUS every known attachment!

A symbol of extreme accuracy for years, this Rivett 608 lathe is used in nearly every instrument and tool shop where fine exacting work is performed. A greater number of modern mechanical marvels have been developed on this small lathe than on all other machine tools combined.

But the 608 is not just a single-purpose tool — it is a small but exceedingly powerful back-geared, screw cutting engine lathe. It has slide areas equal to those of other lathes twice its size — its bronze-bearing spindle guarantees finish and perfect roundness for all work turned. Finely-made attachments for milling, spiral-cutting, slotting, relieving, taper turning, radius turning, grinding, and forming enable the user to complete his entire series of operations utilizing the inherent precision of the lathe itself.

GUARANTEE

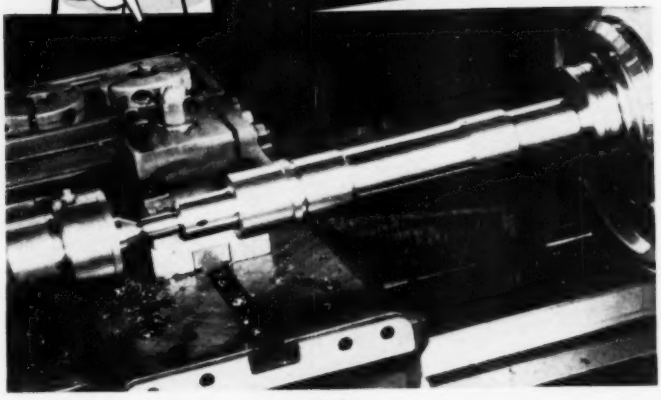
The Rivett 608 will turn or bore within 0.0001" in six inches work held in collet, and turn between centers within 0.0001" in six inches. The Rivett 608 will face to eight inches diameter within a limit of 0.0002" concave, 0.0000" convex. The Rivett 608 will cut threads within 0.0005" in twelve inches, or within 0.0003" in any three inches, or within 0.0002" in any inch of a specimen piece.

You'll be adding your name to a prominent list of users by installing a 608 Rivett. For a more detailed story, write for Bulletin 608F.

RIVETT **LATHE & GRINDER, Inc.**

Dept. AMR3, Brighton 35, Boston, Massachusetts

For More Precision Work *RELY ON RIVETT LATHES AND GRINDERS*, The Master Craftsman's Master Tools



THREADING DETAILS
Part—Pump Shaft
Material—Tough Stainless Steel
Threads — 5/8 Inch Diameter, 18 Pitch, Length 27/32"
THREADING TIME 13 SECONDS

THE POINT THAT PAYS OFF in:—
Greater Threading Speed
Greater Threading Economy
Greater Threading Versatility
in either production or jobbing shops!

CRI-DAN
Single Point
High Speed
Semi-Automatic
THREADING MACHINE
Outmodes former methods
*
Why not contact your Lees-Bradner Representative?
Ask for Bulletin 75-A

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

I'd also like to comment on another article on that page; the one on separating laminations: An easy way to separate laminations after they have been annealed is to pass them through a strong ac field. While under the influence of this field they are repulsed and attracted to one another 7200 times per minute (60 cycles) and separate like a deck of cards, with the exception of those which are *tightly* welded.

I would recommend this method in preference to dimpling electrical laminations as this (dimpling) would, I believe, result in a low-efficiency apparatus with pronounced hum. Inasmuch as the dimples would not set into each other, there would not be as much core material for the space provided, and it would increase the magnetic resistance, or, in other words, reduce the flux. Unless the laminations are flat and burr-free they would not be used in a first-class piece of equipment and several things are desirable to make them that way.

Dies should be made with no clearance (iron-to-iron), and the product taken from the press with a chute feed. Now something that possibly is overlooked is that rubber gloves should be used when handling laminations from raw stock until after they are annealed because perspiration is (in my opinion) a major cause of sticky laminations, and any body products act as pickling agents.

William S. Gilbert
Bridgeport, O.

Why Not A Summary

Round Table articles may not be remembered when the comments are published a few weeks later . . . Would it not be well if the subject were printed again—perhaps in small type to save room—along with all comments in one issue when all comments are in? I believe your readers would get a more thorough understanding . . .

Martin H. Ball, ME
Watervliet, N.Y.

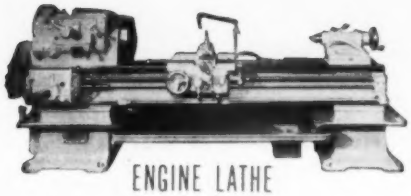
Summary may be a practical addition, but printing all comments in one issue would be impractical because of variation in available space. —Ed.

SPRINGFIELD LATHES

Solve every lathe turning problem

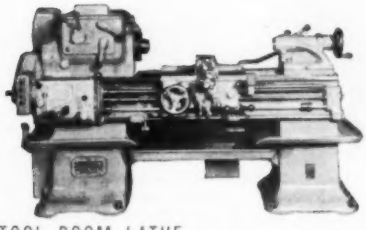
Adaptability to every lathe turning problem and extreme versatility are characteristic of Springfield Lathes. Built with close precision and strict adherence to the highest standards for each component part, they are rugged, reliable, accurate performers on all types of work.

Anyone of the 16 speeds can be selected quickly and easily to meet the requirements of the tool and the work. Low speeds for heavy cuts or high speeds for carbide cutting tools are instantly available. The Springfield 3-lever speed shifting system reduces the amount of shifting required in the normal sequence of operations.



ENGINE LATHE

Sixty quick change threads and feeds give an exceptionally broad setting for many kinds of work. Threads such as 11½ and 27 pitch which usually require transposition gears are included in these ranges and the standard feeds and threads can be varied greatly.



TOOL ROOM LATHE

Easy to set up and operate, these modern lathes are noted for their wide application and their accurate, sustained performance on all lathe turning work. Ask about their adaptability to your own turning problem. Springfield Lathes can solve them—and on a high production schedule.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representation in All Principal Cities

Reeves vari-speed Motodrive

your best buy in a complete variable speed power plant

here's why:

1 A *complete,* self-contained variable speed power plant combining motor, REEVES speed varying mechanism and speed reducer in one, space-saving unit.

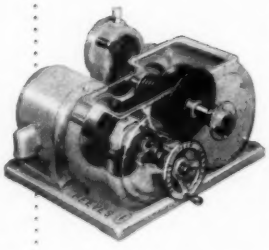
2 Available with any standard, constant-speed, foot-type motor—the same as motors on your other machines—no stocking of special motors.

3 Easily applied to machines in service. Horizontal and vertical models; speed ratios 2:1 through 6:1; sizes 1 to 20 hp; manual or automatic controls. Fractional hp units also available in ratios up to 10:1.

4 REEVES operating principle—proved in 300,000 installations—assures *positive, accurate* speed changes without stopping machine.

For *your* machines, new or old, specify REEVES Speed Control and secure all the benefits of stepless speed adjustability. For full information, send for catalog No. A64-509.

Here Is How It Works



Phantom view of horizontal model with single reducer.

The Motodrive utilizes proved REEVES operating principle of a V-belt driving between two pairs of cone-shaped discs which are adjustable to form an infinite number of driving and driven diameters. Discs are mounted on parallel shafts. One shaft receives power at constant speed from motor—other delivers power at infinitely adjustable speeds to gear reducer from which desired speed is transmitted to driven machine.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized leader in the specialized field of speed control engineering

accurate · variable

REEVES *Speed Control*

SPOT NEWS of Metalworking

- **"Constant-pressure" lathe,** which can determine how hard or easy a metal will be to machine, was described by Francis W. Boulger, supervising metallurgist of Battelle Memorial Institute, at annual meeting of American Society of Tool Engineers in New York. Lathe operates with constant pressure feeding the tool into work, supplied by a weight-and-pulley system. As carriage moves, cable pulling carriage rings a bell with every .002 in. of carriage travel. Every time bell rings, operator records number of revolutions the spindle has made. Feed is a more sensitive indicator of machinability than tool pressure.

- **Auto makers are working with lacquer companies to get chrome finish** which will replace plating or stainless steel trim for cars. One maker has developed a product which will cover up to 5000 sq ft of surface with 100 lb of powdered chrome pigment. Claim is that this new product has greater resistance to corrosion than electroplated steel now used.

- **New type of carbide-tipped boring tool** is being used which can be precision-located in the boring bar. This makes possible presetting of tools in quantity on the bench and replacement in a machine in seconds rather than minutes.

Tool steel industry has asked for full-fledged NPA program to secure raw materials, with privilege of using DO's. Chief concern is over tungsten and molybdenum for steel alloys. NPA says it is studying plan to provide the industry with as much material "as possible."

- **Bismuth has joined controlled materials with NPA Order M-48.** Bismuth metal or alloys may be used only for essential purposes, effective April 1. Producers must fill DO orders up to 50% of production, and must set aside another 20% for a reserve. Only NPA can grant authority to draw upon reserve. Squeeze comes from use of bismuth for precision dies, bearing metals, low-melting-point alloys, and tempering baths for steel.

- **Rotary piston-less, cylinder-less engine has been developed** by Paris, France, engineering concern. Engine has eccentric cylindrical rotor which revolves within a cylindrical stator. Contractible blades set in slots in the rotor form combustion chambers as the rotor turns by dividing the cylindrical stator into hermetically-sealed sections. A prototype is being considered by an Argentine company.

- **Steel tubing instead of copper is being used by a midwest refrigerator maker.** Other substitutes reported by metalworking companies: gray iron castings instead of zinc die castings; chrome and vanadium steels for nickel and "moly" steels; cold-rolled sheets for drawing-quality sheets where it is "nice but not essential" to have good drawing quality.

- **200 machine tools a week were released to contractors** during January by Army Air Force from its reserve storage depots at Marietta, Ga., and Omaha, Neb. Rate of release is being doubled this month. Air Force claims this procedure is paying off with production of contract items starting within 3-4 months from date of letting. When depots are emptied of tools, they will be turned over to plane makers for manufacture of new planes.

Pool orders for cutting tools and for gages are under consideration by NPA's Machinery Division. If placed, they are likely to total around $75 million for cutting tools and $20 million for gages. Action will not be taken until pool orders for machine tools have been processed.

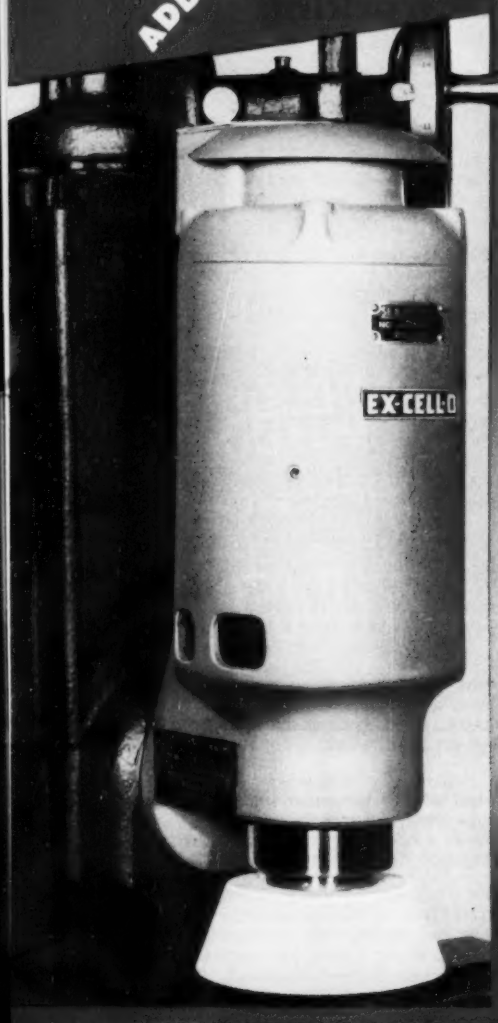
- **AFL's metal trades unions are kicking up a fuss** over 28% to 40% rent increases, effective August 1, ordered by AEC at Oak Ridge and Hanford. AEC objective: to eliminate advantage over large numbers of workers who must pay higher rents plus transportation off reservations.

- **Forge-tapered aluminum wing spars** now are in use, eliminating riveting splice plates to two extruded T's, saving about 50 parts, reducing fighter-plane weight. Alcoa extrudes an I-beam with bulb section at central axis, then flattens portion of bulb by forging so that the flanges spread apart on an even taper. Web tapers from 10 in. width at one end to 15½ in. at opposite end of 13-ft spar. McDonnell Aircraft machines the item for planes.

ADD FLEXIBILITY TO YOUR SURFACE GRINDERS WITH

EX-CELL-O

PRECISION SPINDLES



Ex-Cell-O 1 horsepower, 3600 rpm inbuilt motor spindle for surface grinder. Spindle swivels vertically, is used for sharpening cutters and broaches.

Standard horizontal Ex-Cell-O Precision Spindle with 1 horsepower, 3600 rpm inbuilt motor for surface grinders. Standard Ex-Cell-O belt-driven spindles also are available for this type of grinder.

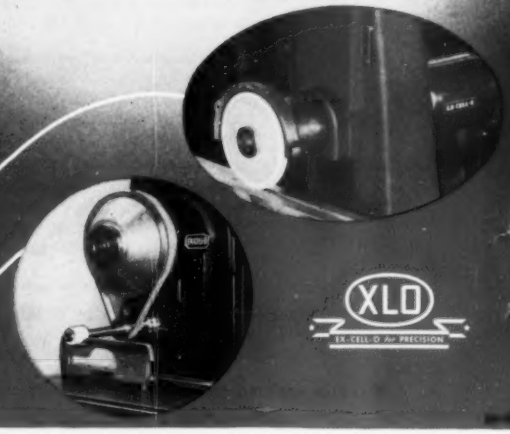
This Ex-Cell-O High Speed Attachment drives small wheels at 18,000 rpm. It is driven by the standard motorized spindle and is supported by the standard spindle or spindle bracket.

You can add to the flexibility of your surface grinders, and perhaps save the cost of another machine, with Ex-Cell-O spindle equipment. For instance the large photo at left shows an inbuilt motor spindle that swivels vertically. It makes a standard surface grinder suitable for sharpening cutters and broaches. A mounting member extends through bore in column that ordinarily houses the standard horizontal spindle.

The Ex-Cell-O High Speed Attachment also adds to the flexibility of surface grinders. This attachment mounts on the standard horizontal spindle or spindle bracket. The standard surface grinding wheel is replaced by a pulley that, through a flat belt, drives the high speed spindle at 18,000 rpm. Thus, small wheels can be driven at an efficient speed for grinding small shoulders, slots and other hard-to-reach places.

For rigid, smooth-running spindles that require no further lubrication or adjustment, and produce fine work day after day, contact your Ex-Cell-O representative or write to Ex-Cell-O Corporation in Detroit.

Send today for Ex-Cell-O's free Precision Grinding Spindle Catalog, Number 25962. No obligation, of course. Just use your company letterhead.



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EX-CELL-O AIR PRECISION

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MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington

Mobilization boss Wilson is in real trouble for the first time since he came to Washington in January. Several potent pressure groups are after his scalp.

But Wilson won't be fired from the top mobilization job. That's been demanded by the pressure boys, but Truman won't hear of it. So they now are sniping at Wilson's policies and his aides in hope he will get fed up and quit.

• • •

Labor is spearheading the "Get-Wilson" drive. But it has strong small business and farm block support. Small business is aggrieved because it has been hurt most by materials controls. Farm groups want to fend off food price ceilings.

The fight will come out in the open soon, probably in Congress. Price-wage controls provisions of the Defense Production Act expire June 30, and Congress already has started hearing on an extension. The labor, farm and small business groups will try to get their own amendments to the act to force Wilson to give each of them special consideration.

• • •

Wilson also is wrangling with the military. But it's all behind-the-scenes and will stay there. Trouble here is that armed forces are taking so long to give their requirements to the mobilizers. Military needs for materials in the third and fourth quarters were due March 1. They won't be ready before April 1—if then.

This slows planning for Controlled Materials Plan, but it won't throw it behind schedule. CMP will go into effect July 1, regardless of military's slowness. The mobilizers are well along on all other phases of preparing for it.

• • •

The lag in letting military contracts is even more serious in the eyes of the mobilization agencies. And it causes much of Wilson's present troubles. The materials cutbacks slow civilian production, then the services fail to take up the slack with military contracts.

Actually, military procurement has been speeded. The contracting rate is now above $4 billion a month. But it still has a large chunk—perhaps as much as a third—of the $28.2 appropriated by Congress for procurement up to June 30.

Military spending plans are enormous, however. For example, the Navy has unveiled a new $2.4-billion construction program. It calls for building 140 new ships, mostly smaller craft, and taking another 292 out of mothballs. The new vessels will include the once-abandoned supercarrier but no battleships.

Don't look for any real brake on wages for the present. Johnston is letting them slide upward even more than the cost of living. Unions have found that the wage policy "gives" easily under pressure.

You can see this in Johnston's plans: Unions can insist on 10% over Jan. 15, 1950. On top of that they can get the 4-cent annual improvement factor next June. They can also go above 10% on cost-of-living escalator clauses. Pensions aren't charged against the 10% allowance, either. Nor are other fringe benefits.

It reflects this attitude of government stabilizers: Wages can't be held down tightly while the Defense Production Act lets living costs rise. DPA must be tightened. You will hear more about this in Congress by June.

• • •

Has the National Labor Relations Board found you guilty of an unfair labor practice? Then you stand a better chance of upsetting the verdict in the courts than you did before.

Courts reviewing NLRB decisions must assume more responsibility for their "reasonableness and fairness" than they have in the past. They must examine all the evidence and not be swayed too much by NLRB's findings. The Supreme Court said this is required because Taft-Hartley widened the "scope of review" permitted the courts.

Taft-Hartley took away labor law protection supervisors had under the Wagner Act. An NLRB trial examiner thinks, however, that when an employer fires a foreman who refuses to help keep a union out of this plant, he really is coercing the employees in their right to organize. Moreover, the foreman should be rehired with back pay.

• • •

Priorities for MRO bogging down already—just a month after National Production Authority set them. Main trouble is the base period. NPA permits any businessman to use a DO-97 to get as many dollars' worth of MRO supplies as he used in 1950.

Mining and transportation protested first. They showed both industries had expanded vastly in the last 12 months, needed more MRO supplies than they did in 1950. Now many others are presenting the same case—and proving it. NPA hasn't worked out an answer yet.

Steel for consumer hardgoods was limited by NPA to 80% of the amount used by any manufacturer in the first half of 1950. Assemblers must get accurate data from their steel fabricators to stay within the limitation—or else cut unit output by 20%.

THE INDUSTRIAL CYCLE

REDUCED COSTS
HIGHER WAGES TO WORKERS

GREATER MARKETS
GREATER PURCHASING POWER

COMPETITION
GREATER DEMAND

IMPROVED DESIGN
IMPROVED METHODS & EQUIPMENT

IMPROVED QUALITY
GREATER PRODUCTION

We are living in an industrialized world. Our ancestors worked much harder and longer hours than we do yet they could produce only the bare necessities of life. We, because of the tools we have to work with, can produce the equivalent of not only all the necessities of life but many luxuries as well.

New machine tools that increase the productivity of the worker enables the manufacturer to Reduce Costs and pay Higher Wages to Workers. Higher Wages creates Greater Purchasing Power and Greater Markets. This means Greater Demand for goods and encourages Competition.

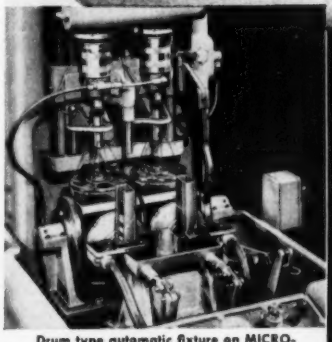
To meet this Competition the manufacturer must adopt Improved Methods and Equipment to get Improved Quality in his product and Greater Production. Greater Production means Reduced Costs and we start the cycle again.

Only by keeping this cycle in balance and in motion can we hope to keep our standard of living at its present high level. Only by increasing man's productivity by providing him with better, more productive tools can we keep our Industrial Cycle spinning.

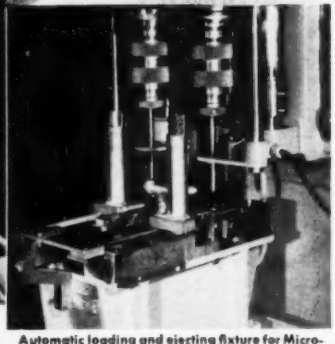
MICROSIZE*, automatic size control, is one of the contributions **MICROMATIC*** has made to modern tooling. **MICROSIZE** has made possible automatic and semi-automatic Microhoning* machines. It has Improved Quality and Reduced Costs by holding dimensional tolerances more consistently and reducing inspection and scrap. It has increased the productivity of the worker many fold.

Do not let obsolete methods and machine tools slow down your cycle.

*Registered U. S. Patent Office



Drum type automatic fixture on MICROSIZE controlled Microhoning machine.



Automatic loading and ejecting fixture for Microhoning gears on double spindle Microhoning machine, made possible by MICROSIZE control.

Write for latest issue of Cross Hatch on the Industrial Cycle.

Micromatic Hone Corporation

8100 SCHOOLCRAFT AVENUE
DETROIT 4, MICHIGAN

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Detroit

Small parts producers, and tool and die shops, are being bothered by competitive bidding on available jobs. There is plenty of work. But many companies have soft spots at hand or immediately ahead, and want to hold their manpower in the tight market that is developing for labor. Accordingly, they are entering profitless bids on passing jobs, expecting to use these jobs to keep their employees at work. The result, of course, is a tough situation for everybody.

• • •

Thus far, the emergency defense program is largely a big-company program—small items are not particularly in demand. You'd think, therefore, that small manufacturers would be tumbling all over themselves to get subcontracts. That isn't quite true, however.

The reason: Although many of the big contracts are on a giant scale insofar as equipping is concerned, large numbers are on a very small scale insofar as actual production is concerned. A supplier will be highly interested in getting a subcontract when he finds out that it involves a large amount of machinery and equipping, all paid for under the contract. His enthusiasm cools, however, when he finds that the production run off those machines will be very small. He knows that after this run (often amounting to a few months of work) he must sit with machines on hand eating up space, not otherwise usable.

The general reaction of many subcontractors, when they find out the whole story on situations of this kind, is to go down the street and look for something better. There's a lot of looking being done—but the better things are hard to find.

• • •

Machine tool deliveries are constantly lengthening auto companies find. Quotations on both standard and regular machine tools are being made from eight months to a year away.

The smallest market for machine tools to military contractors is to those companies which are making guns and big ammunition. Such companies are finding 75% and more of the machine tools in government storage—these were special purpose tools which have no other applications of consequence, so after World War II they went into grease coatings and have been there since. Contractors are finding these tools in very good shape, and are installing them back in military production locations without having to do much refurbishing.

• • •

Elimination of nickel on bright work has not made a problem as yet for automobile companies. They are putting chrome on copper base, and finding the result just as good for the car in the showroom. When the owner gets the car he will have to do more maintenance to keep his shiny parts bright—home workshop people say the best way to do it is to rub over the chrome frequently with a mineral oil-wetted rag. The oil soaks into the pores, protects the chrome. Other approaches: Polished zinc, aluminum paint.

• • •

Magnesium sheet will be a lot cheaper a year from now. By then Dow's new continuous rolling mill at Madison, Ill., will be operating. Not only will sheet be cheaper, but it will be available in wider widths. The largest mill at Madison will be 84 in. wide; the largest Dow now has is 48 in. That will make possible many magnesium applications which formerly had to be welded. It is probably safe to expect that the bulk of the Madison production will go into aircraft applications.

• • •

Auto replacement parts makers are seeking larger steel allocations, claiming replacement parts for cars on the road require enlarged production. Their position is amply demonstrated by recent Polk statistics: During 1950 licensing of cars (6,326,438) and trucks (1,142,307) were by far the highest totals for any year on record.

• • •

Chrysler Corp. is going to build a proving ground, in Washtenaw County, Michigan, west of Ann Arbor. About 3800 acres of land have been acquired; test machinery will be installed in the buildings to be erected.

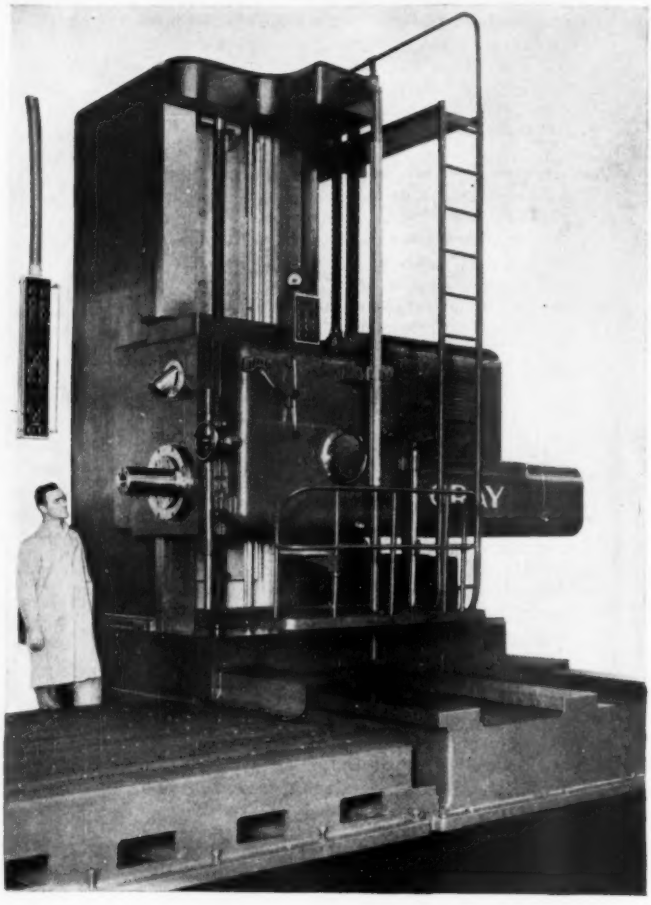
General Motors, meanwhile, is enlarging its proving facilities, having bought 1000 acres of land adjoining its present proving grounds at Milford, Mich. The new space, rugged and tough, will test military vehicles build by GM.

• • •

Chrysler keeps expanding. The company announced a new engine plant at Trenton, Mich., some months ago; it has now decided to double the size, up to 1,000,000 sq ft of manufacturing space. This will enlarge the plant's machine tool requirements; the increase was decided on to relieve pressure at some of the other company building operations.

Present plans call for civilian production only at the plant. There was some conjecture that possibly the enlarged size came about when the company looked over its arms requirements in the period ahead and decided that machining needs a year or two hence for a combined military and civilian load would call for the added half million square feet.

WHY—100 H.P.?



Really modern Horizontal Bars must have the power and rigidity to do productive milling with carbide cutters, even when the head is high up on the column.

That is why GRAY Horizontal Bars have spindle motors running up to 100 HP—Power Cross Feed to Column so milling cutters can be mounted directly on the large diameter driving sleeve instead of the bar—Columns as large at the top as at the bottom to minimize bending and torsional vibration.

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Machine Tools

Distribution of pool orders and setting up of priorities on deliveries are the main topics absorbing attention of machine tool builders.

To acquaint the industry with details of administering Orders M-40 and M-41, NPA is planning a series of regional meetings.

NPA's Machinery Division has been holding group meetings with machine tool companies. Turret lathe makers and gear-cutting machine people were each called to Washington for one-day sessions recently.

Some of the machine tool requirements bandied about make builders goggle-eyed. Example: 22,000 turret lathes. This figure is believed to have originated in the armed services and is viewed as unrealistic and fantastic by the industry, unless all-out mobilization should be ordered.

After having presented case for expediting deliveries of U. S. machines for British program, A.J.M. Baker of U. S. Economic Mission in London has returned to England.

British are desperately trying to speed the tooling for their armament plants. They are reported to have ordered some 14,000 machine tools altogether, of which British builders will furnish 5000 and U. S. builders 3800. Over 1000 machines will come from western Germany.

• • •

Swiss, Belgian and French machine tool builders are participating in British program. In fact, James Blackshaw, Ministry of Supply Under-Secretary, has been scouring the Continent for machine tool sources. He is said to have offered to take output of certain Italian builders for next two years.

British would like to double number of machine tools secured from all available sources, because their defense schedule has been upped sharply. But they realize the futility of trying to get within a reasonable time more machines than now are ordered.

• • •

Only 900 of 3800 tools on order for British in this country are rated. Washington is waiting for detailed data from London to support British claim that all 3800 should have DO's before granting such priority. Fact is that all are likely to get DO's eventually.

British have halted all exports of machine tools which can be used in their own defense program. Exports of British tools now are confined to Commonwealth nations, London reports.

French have a limited number of machines carrying DO's on order here. Deliveries are better than British will get, principally because French orders automatically got DO's under AMP program.

Survey of machine tool rebuilding facilities is being made by Machinery Dealers National Association at request of Washington. Members are being asked to name shops in their areas where open capacity exists for rebuilding. Information is going to Brigadier General Merle H. Davis of Army Ordnance Corps.

Leslie J. Carson, associated with Link-Belt Co., is new chief of Machinery Branch of Machine & Manufactured Products Division of Office of Price Stabilization.

• • •

Machine tools for defense contractors which will be bought with government money or on which the government has an option to purchase later, now carries a DO-19 rating instead of DO-21, as previously.

Any machine tool builder who is in dire need of a new machine tool to fill defense orders but is unable to get it without waiting for months, can apply to NPA's Machinery Division for relief. After M-41 takes effect, a diversion order will do the trick. However, NPA will use this authority sparingly.

Unrated as well as rated orders received by machine tool builders after April 1 may be charged against pool contracts, according to latest NPA ruling.

Regulations on finishes and on electrical equipment for machine tools are expected soon from NPA. General Motors is said to be much disturbed over any action which might tend to weaken or destroy J.I.C. electrical standards set up over the past few years.

• • •

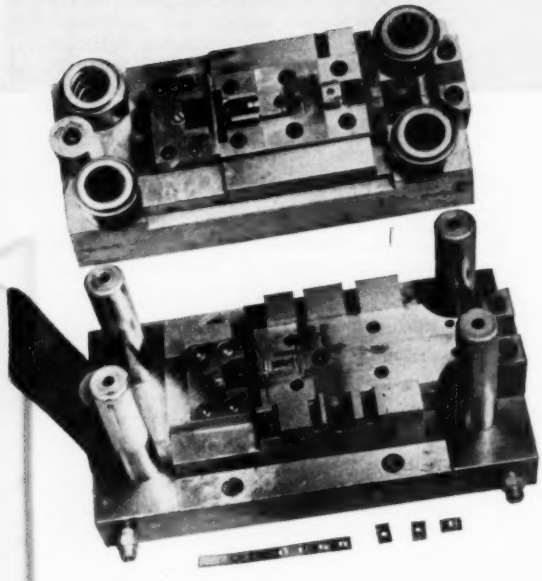
No price administrator has yet been selected for machine tools. Meanwhile at least one prominent machine tool builder no longer will quote prices on new machine tools until it can get some clarification of the price situation. This company currently is taking orders for last half of 1952.

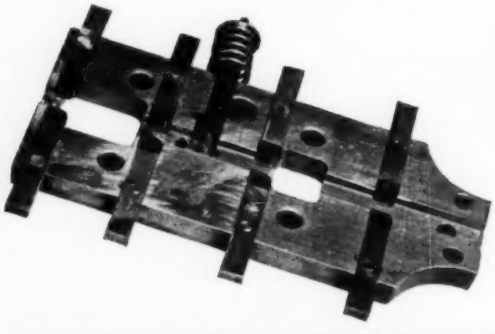
• • •

Marshall Smith, chief NPA's Machinery Division, will have charge of only production equipment hereafter (including small tools and materials handling), divesting himself of farm equipment, electrical equipment and other products.

For detailed facts on machine tool pool contracts and on new E-1-B priority system (NPA Orders M-40 and M-41), turn to stories on pages 178, 181. New E-1-B was first described in American Machinist, August 21, 1950, p. 148.

Tinnerman gets 7,000 per die





INCREASED production, decreased maintenance downtime, lower die maintenance costs, better product quality control . . . those are the benefits Tinnerman Products, Inc., reports from its use of Carboloy dies in producing SPEED NUTS®.

Today Tinnerman has 34 multiple station progressive die sets in which Carboloy die parts are used at *all* stations. More than 550 separate Carboloy die parts are used in these 34 die sets alone!

Cut tool maintenance cost

Since Carboloy parts were installed on the 4-station progressive die set shown at left, tool maintenance cost has dropped two-thirds. A recent study showed an average gain of about 7,000 extra pieces per hour as compared to formerly used steel dies! With results like these it's no wonder that Tinnerman is replacing steel dies with Carboloy dies wherever conditions permit.

Carboloy dies can probably deliver similar results on your blanking, forming or cupping operation. For complete information write today for Die Engineering Manual D-124.

(Upper Left) This die set uses Carboloy die parts at all stations. Stock is SAE 1060, 13/32" wide and .028" thick. Feed and blank length is .632". Operating speed: 750 strokes per minute. *(Lower Left)* Carboloy tips, copper brazed to ends of stock guides in this stripper assembly, outlast steel many times, keep stock perfectly aligned with tools.

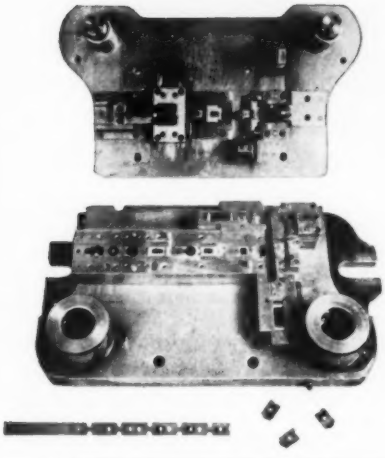
FOR MAXIMUM PRODUCTIVITY...

Specify **CARBOLOY**

THE QUALITY BRAND

extra pieces per hour with CARBOLOY® dies!

CEMENTED CARBIDE



Carboloy dies increase pieces per grind 16 to 1!

Tinnerman produces J-Type SPEED NUTS® with this die set. It has produced nearly 50,000,000 pieces in 2½ years with regrinding every 5,000,000.

Carboloy dies are used at all stations and outlast steel 16:1. The punch in one station has gone nearly 50,000,000 pieces without being reground, while previously used steel punches had to be retired after 1,000,000.

Stock is SAE 1060, .040" thick and 9/16" wide. Feed and blank length is 1.506". Die is used on open-back inclinable press operating at a speed of 250 strokes per minute.

Carboloy dies pay off on simple jobs, too!

A manufacturer of radio tube parts punched, drew and trimmed 8,000,000 parts from .0095" thick stainless steel (30% chrome) on this single set of Carboloy combination dies without reworking the dies during the entire run.

Whether you need standard dies available from Carboloy Company; simple Carboloy dies that you can make in your own shop; or complex dies available through many die shops, you will find Carboloy dies bring you advantages in drawing, cupping or blanking that you can find nowhere else.

For further information about application, design, fabrication and maintenance of Carboloy dies, write today for Die Engineering Manual D-124.

CARBOLOY COMPANY, INC.

11149 E. 8 Mile Road **Detroit 32, Michigan**

Cemented Carbide Drawing, Forming and Blanking Dies

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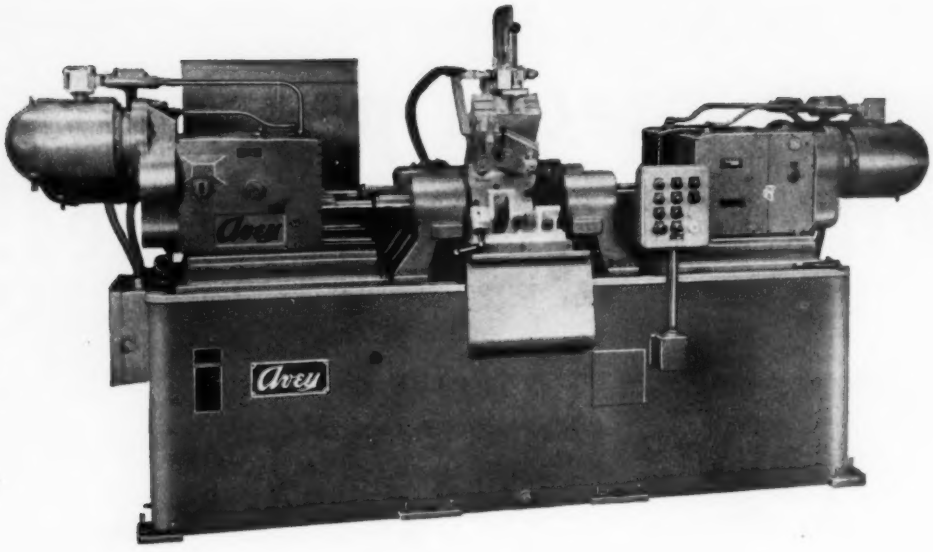
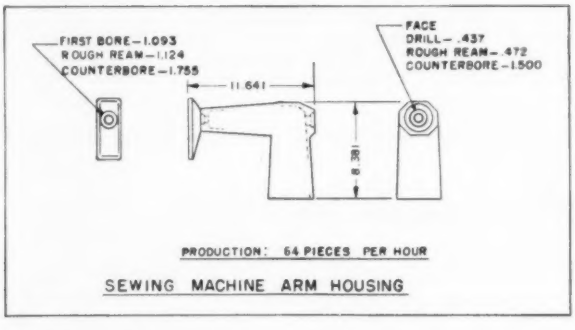
® The registered trade-mark "SPEED NUTS" denotes manufacture by Tinnerman Products, Inc.



Avey PRODUCTION TYPE BORING MACHINE



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Part—Sewing Machine Arm—Cast Iron and Aluminum.

Production—Increased 100% over previous method.

MACHINE S. O. No. 17676

Above machine utilized four (4) No. 2 *Avey* Automatic Cam Feed Units mounted horizontally on a steel fabricated base. Each spindle rigidly supported at cutting position by heavy duty precision needle bearings.

Fixture—Clamping done at one stroke with equal force by hydraulic cylinder. Fixture traverse from No. 1 station to No. 2 station and back is automatic by hydraulic cylinder.

Machine accommodated four different sets of fixtures for different sewing machine arms.

Machine included latest design of electrical control panel with electrical interlock between all unit parts of machine.

Replace your obsolete Drilling and Tapping Equipment with **Avey** Special Machines. Write *today!*

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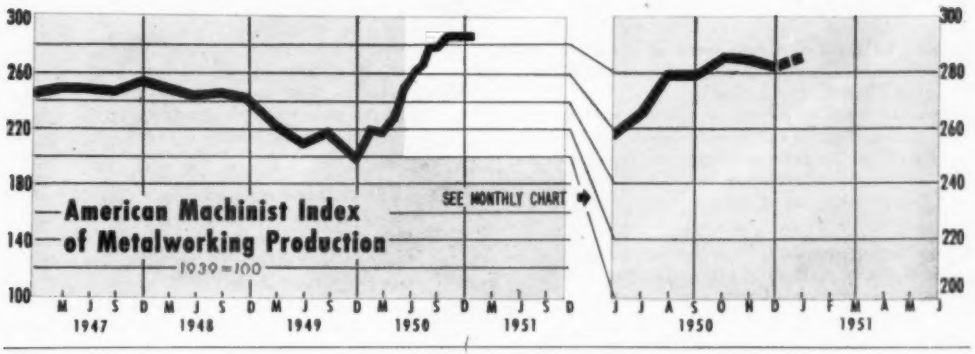
Gaging Metalworking



No End to Metalworking Boom in Sight

Metalworking continues to boom. And the end is not in sight. Cuts in civilian goods up to now have been trifling.

Auto and truck production has been rolling along at a fantastic level: a 10-million-a-year rate. Appliance output is below the fourth quarter's volume, but is at the 1950 annual rate. Construction is keeping pace with last year.

• • •

Military buying in January was nearly $6 billion. February duplicated January. And that helped metalworking. In December the total was under $2 billion.

Big companies are getting the armament contracts. General Motors has more than $3 billion wrapped up, and Ford around $1 billion. Note the tank contracts to Ford and to Fisher Body, latter for $195 million.

Large prime contractors, however, will do extensive subcontracting.

• • •

Though cutbacks will occur in the second quarter, civilian goods still will be turned out in volume close to the 1948 level—and that was a big year.

There is at least an even chance that household appliance production, especially in certain items like ranges and refrigerators, may have to be pared later on because retail demand has not kept pace with factory deliveries to dealers. If that should happen, it will come by midsummer.

• • •

Westinghouse's president Gwilym Price states that his company has cut consumer product output 20% below fourth quarter, thanks to diversion of critical materials to defense industries.

He predicts production of consumer goods by all companies this year at 74% above 1935-1939 average, or 18% higher than in 1946.

• • •

Shipments and new orders for screw machine products rose in January, National Screw Machine Products Association reports. New orders were at 528 (with 1940 as 100), against 438 in December. Shipments were at 374, up considerably from 332 the previous month.

Backlog for screw machine products is still rising, standing at 17½ weeks. Majority of the industry is on a two-shift basis, 50 hr. a week.

• • •

Workers laid off in metalworking plants have no trouble getting jobs immediately. That is big worry of companies which have cut operations but expect to secure DO orders soon.

• • •

Amount of dislocation from shift to defense work is likely to be far less than was anticipated. Widespread unemployment in metalworking as some observers predicted, will not occur.

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AMERICAN MACHINIST'S INDEX OF METALWORKING PRODUCTION is based on manhours worked in the five components above.

* Estimated (p) Preliminary (r) Revised

Gaging Business

Around 59 million people were at work in mid-February. That is 2 million more than in the same month a year ago.

Unemployment is estimated at 2.4 million last month. That is extremely low; it is 2.2 million less than in February, 1950. So far conversion of plants to defense work has not thrown many men out of jobs.

• • •

Cost of living jumped to new record high the middle of January. Result: a boost in pay to over 1 million workers whose wages are tied to BLS cost-of-living index.

Wholesale prices, however, declined the week of February 27 for first time in more than four months. Price freeze and rollback of prices are being felt all along the line.

But don't be fooled. This happy trend is only temporary. Wholesale prices are expected to go up another 5%, and perhaps 10%.

• • •

Labor pirating has greatly increased as result of Wage Stabilization Board rules. Many metalworking shops find their wage scales frozen below those of competitors and of mass-production plants and are being stripped of their best men. Realistic area wage rates is one possible remedy, George S. Eaton, executive secretary, National Tool & Die Manufacturers Association, suggests.

Controlled Materials Plan may be started in April with copper, aluminum and steel. Later such items as cobalt and tin will be added, and gradually the entire list of critical materials will be filled out.

Amount of copper to be set aside monthly for the national stockpile is reported to have been cut.

Manufacturers will keep inventories as high as possible this spring and summer. That will be true all along the line, with distributors and dealers, too.

• • •

There will be more wage increases. Wages can be raised as much as 10% over the January 15, 1950, level to "catch up" on rising living costs. Only about 2 million of the 40 million workers now employed in private trade and industry have had that much. They are mostly in the big industrial unions. Average is nearer 5%.

• • •

With or without DO orders, materials are very scarce on west coast. Some small shops in Los Angeles district, flush with defense business, are bitter over what they call "supplier-favoritism" toward old-line customers.

Experimental work, outside defense, has all but ceased. One tool shop said that it had "scraped the barrel" to get material to finish its last non-defense experimental job.

Big aircraft makers are being besieged by hundreds of prospective subcontractors, who want DO-rated work. Without it, these subcontractors know that they might as well put away their tools for the duration.

Metalworking companies in San Francisco area are just as busy as labor and materials scarcities will let them be.

Metals suppliers are scheduling their third quarter quotas covering current DO's. On certain products, such as cable, they are setting up early 1952 requirements.

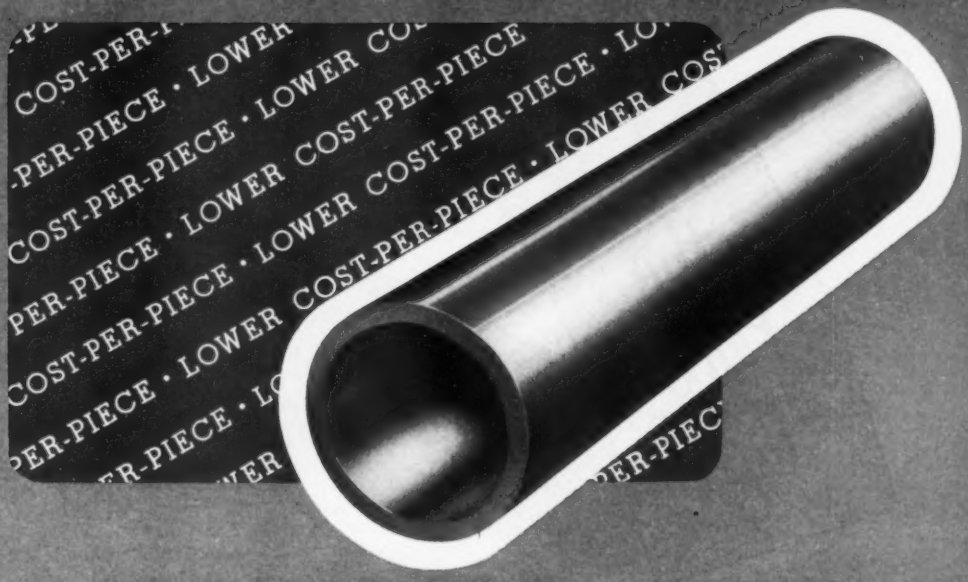
WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	236.7	237.1	185.4
Steel ingot operation (% of capacity)	101.0	99.8	73.5
Electric power output (million kilowatt hours)	6,822	6,833	6,879
Production of automobiles and trucks	180,584	199,267	124,072
Engineering construction awards (Eng. News-Rec., millions)	$258.9	$352.1	$210.6

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators, domestic sales (thousands of units)	489	394	376
Vacuum cleaners sales (thousands of units)	282	289	249
Washers sales (thousands of units)	321	377	276
Household electric ranges sales (thousands of units)	132	124	97
Television receivers production (thousands of units)	767[1]	859	439
Radio receivers AM and AM-FM production (thousands of units)	800[1]	957	546
Gear sales index (1935-1939 = 100)	764.6	680.2	280.2
Foundry equipment new orders index (shipments 1937-1939 = 100)	885.5	526.2	159.2

* Seasonally adjusted. [1] Estimated.



BROACH REDESIGN *ups cost 16% . . . . but* SAVES *$880.00 monthly!*

DETROIT BROACH CAN CUT YOUR COST-PER-PIECE *by*

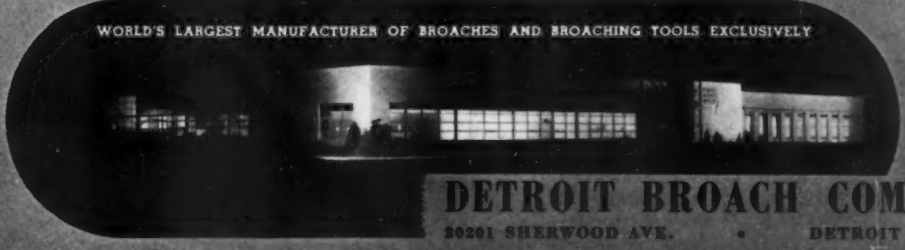
1 Developing broaching set-ups to replace other, more costly machining methods.

2 Redesign present broaches and broaching set-ups to make them more efficient.

Review of present broaching operations by qualified specialists can usually increase broaching efficiency. An example is the broaching set-up for the 1½″ inside diameter of the 8″ long, soft steel tube above. Here is what happened when Detroit Broach engineers studied the broaching set-up.

By changing the tool design, the number of sharpenings per tool was increased 26%. Change of steel and heat treat, as well as improved manufacture of the tool, upped the number of pieces produced per grind 46%. Thus, even though original cost was increased $18.00 per tool, cost-per-piece was reduced 50% . . . *a net saving of $880.00 per month!* In addition, reject rate for the operation was cut from 11% to 3% due to the substantial improvement in surface finish on the parts.

This is a typical example of how Detroit Broach specialization pays off . . . in ingenuity that comes only with singular familiarity with all phases and types of broaching. Whether yours is a new broaching application or raised sights on a present one . . . consult Detroit Broach for actual cost and production data.



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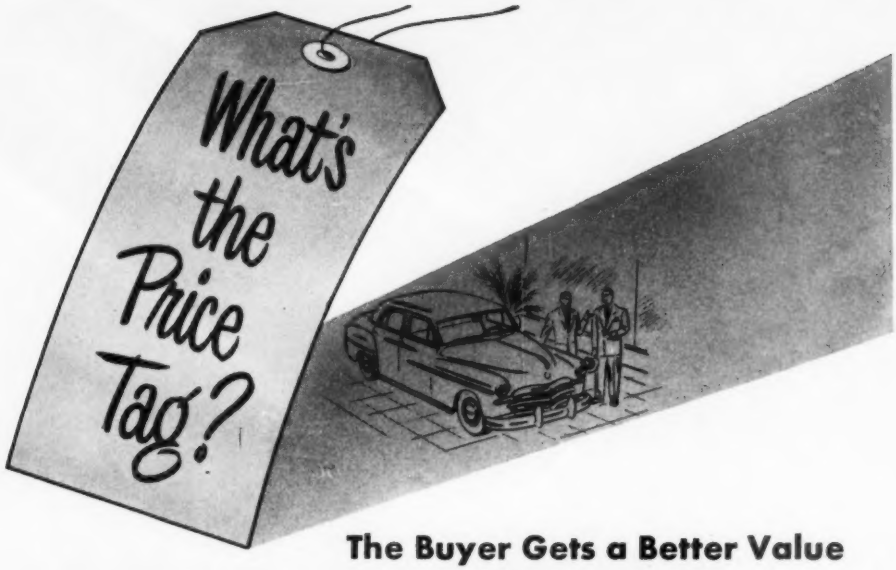

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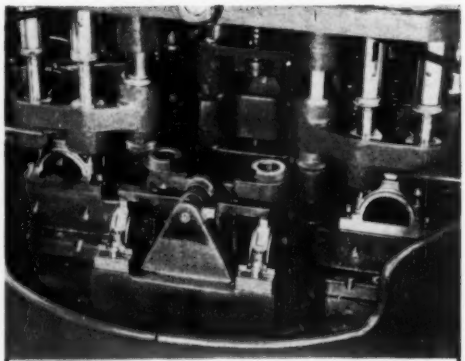

Hand-clamped in pairs, forged steel (SAE 1041) connecting rod caps are rough spot faced, finished spot faced and countersunk (a total of twelve operations on the two parts) at a rate of one part every 8 seconds!

Automotive Connecting Rod Cap—Two Views.

In the auto plant or in the showroom . . . it's an American trait to want quality at a price. The manufacturer gets it in a MORRIS Engineered Production Machine . . . for a better product at less cost . . . and passes it on to the buyer in a mass produced car.

MORRIS Production Machines cut time and costs wherever multiple drilling, reaming, tapping, boring or similar operations are performed. In addition, a major plus feature is offered, namely, all machines are built from *standard units* to do a *special job* . . . a real savings in initial costs.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Labor's Astonishing Withdrawal

Imagine the hullabaloo if industry had withdrawn pompously and blatantly from the defense program, as labor did!

Industrialists would have been targets for the juiciest epithets — traitors, greedy money-grabbers, selfish and arrogant lusters after power.

Labor's astonishing withdrawal, on the other hand, brought forth no such outbursts. Congress, for the most part, wrapped itself in dense silence, a tribute to labor's political weight-throwing ability. President Truman mildly termed it a "disagreement."

IT IS HARD TO BELIEVE that labor's decision "to take a walk" was based on much more than petulance. Labor had equal representation with industry on the Wage Stabilization Board. And by no stretch of the imagination could the public members of the board be called anti-labor.

Labor had one of its own as a top adviser to Defense Mobilizer Charles E. Wilson. It had its members in other key defense spots.

The way had been opened officially for wage rates to rise, despite the so-called "freeze." The cost-of-living escalator clauses in wage contracts will be allowed to stand. In other words, Washington went farther than half way to see that labor got its just dues.

Surely labor cannot expect the country to go through the agony of another Knudsen-Hillman two-headed arrangement in its defense set-up. It didn't work in 1941, and it wouldn't work now.

SURELY LABOR cannot expect manpower to be lifted out of its context as an integral part of the defense set-up under one chief and be placed under a separate director who acts independently of the defense mobilizer. That would lead quickly to confusion and disagreement.

The truth is that, no matter what its alleged grievances might be, organized labor cannot justify the ugly fact that it refused to play ball unless its players were assigned the exact desired spots on the team. This intransigent attitude already has led to bitter feeling. It has dismayed our allies and delighted our enemies.

It made a mockery of the idea that we are in a national emergency. It has retarded progress of the defense program and has harmed morale.

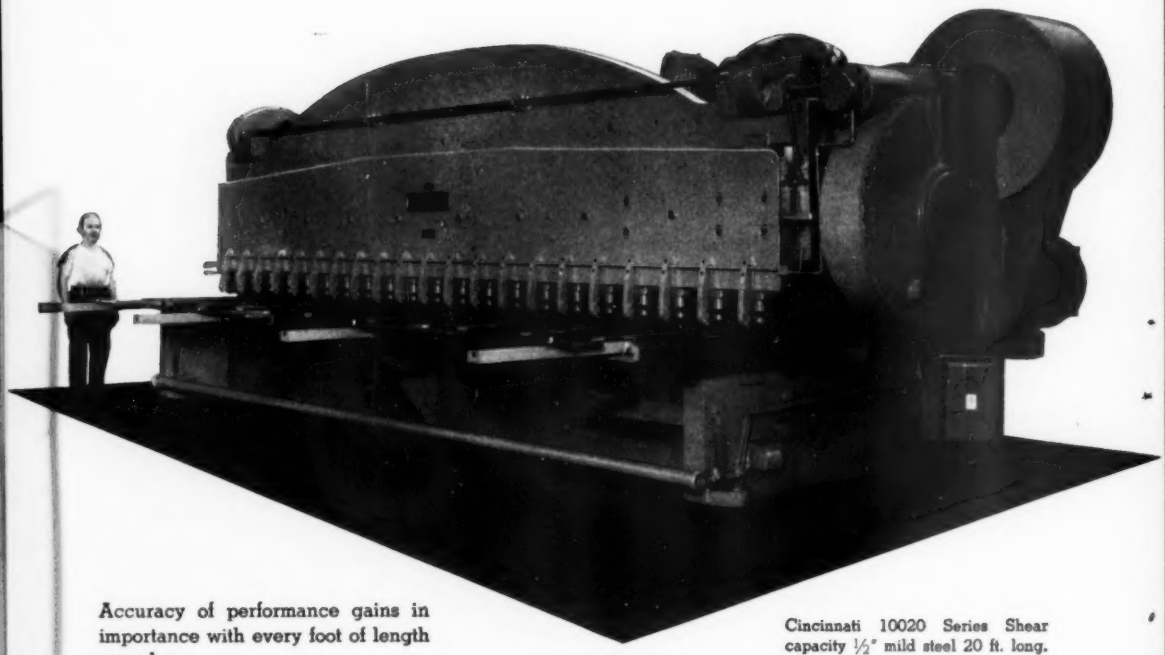
WE HOPE that before this appears in print, union chiefs will have realized the injury they have done to the national defense cause and will have resumed their places in the counsels of defense mobilizers.

Any other solution would be an abject surrender to a pressure group and would provide a dismal example of what happens when one economic segment of the population becomes too powerful.

Burnham Finney

"CINCINNATI" shears 20 ft. of ½ in. plate

...straight and true



Cincinnati 10020 Series Shear capacity ½" mild steel 20 ft. long.

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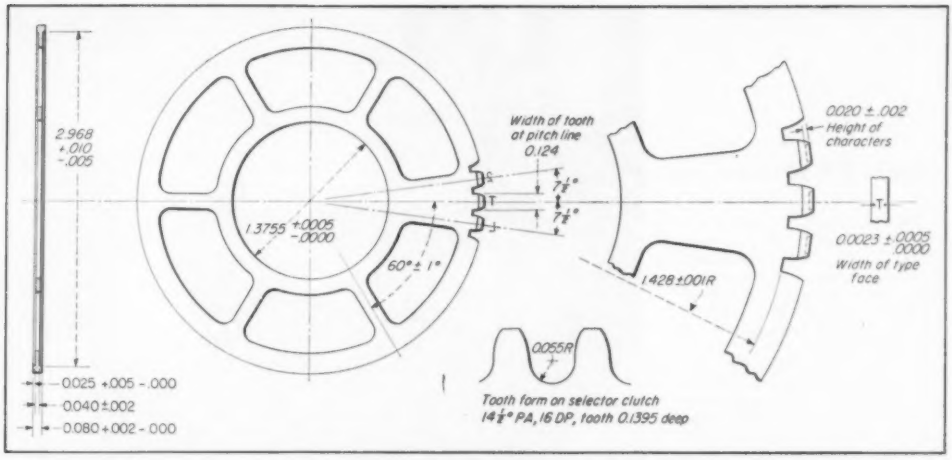
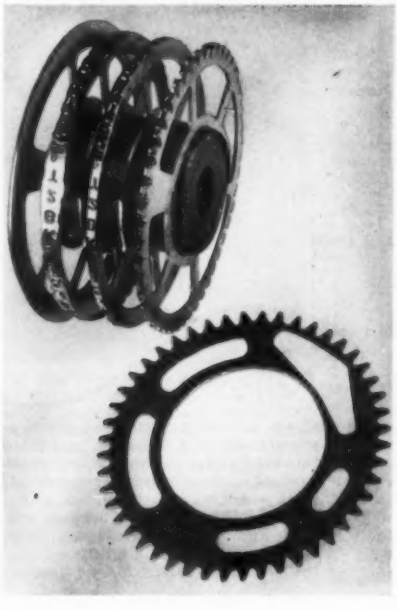


Print wheel makes unnecessary the previous complicated arrangement of type bars and indexing arms, is faster and more compact. Wheels must, however, be exactly to close specifications, characters 0.020 in. high, with sides at 85° included angle and a flat 0.0023 + 0.0005 — 0.000 on top, the latter wide enough to avoid cutting type ribbon or paper, yet narrow enough to give a sharp impression. The finished wheel must be flat and square within 0.002 in. Composite radial displacement of teeth must be within +0.0005, — 0.0025. Theoretical pitch diameter is 3.00 in., actual 2.999 in. Teeth are 14½° pressure angle, 16 DP, 0.124 thick, must not vary in alignment over 0.002 from the center line of the "T." Selector clutch gear (lower center) clears characters on print wheel

These Gear Teeth Are Characters



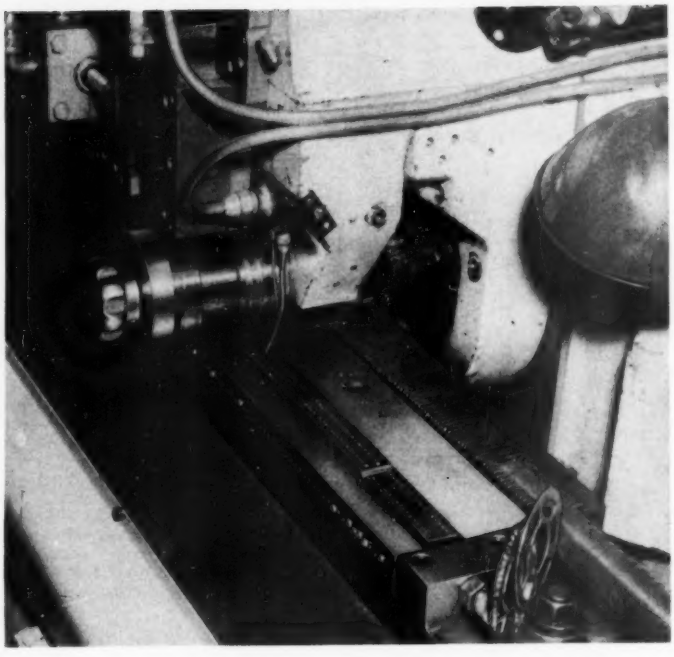
Letters and numbers are rolled to tenths into the periphery of a steel blank, which is then hobbed to form a toothed print wheel for the new IBM alphabetical accounting machine

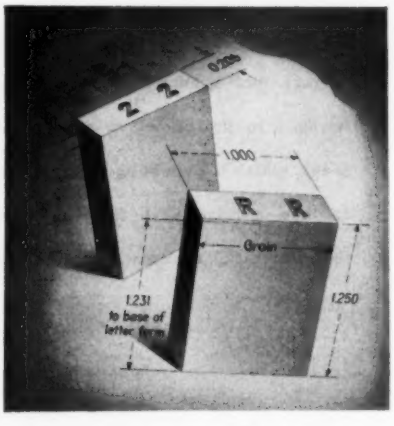
BY E. J. TANGERMAN
Executive Editor

←**Three steps** in making the print wheel are here side by side, with the 3.125-in. punched selector-clutch gear that drives the wheel below. (Mongrel teeth on the selector gear are 0.1395 in. deep, and spaces must clear print-wheel type. In the group, the blank is at left, with the rolled wheel, trimmed wheel, and toothed wheel in order. The print wheel is blanked from SAE1010 electrical iron 3.220 in. in dia and 0.040 in. thick. Rolling in the 48 characters at 7½° spacing expands a flange on the rim to about 0.160 in. wide (irregular) and reduces diameter to 3.073 in. ± 0.002 in. with characters projecting 0.020 in.

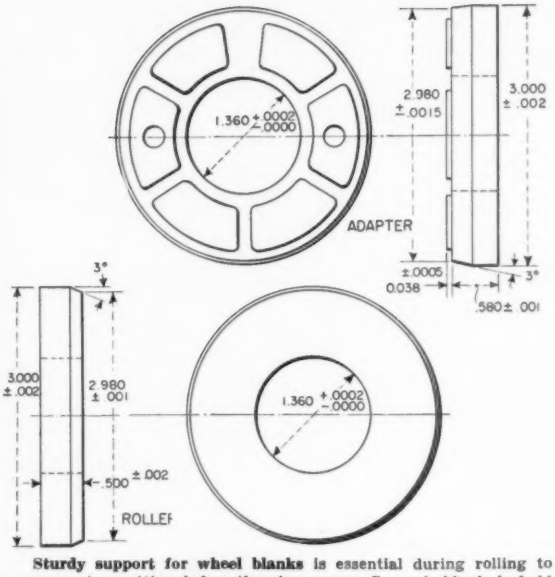
CHARACTER ROLLING

Rolling two blanks at a time over characters engraved in a sectional die block creates embossed lettering around the wheel rim. About 40 pc per hr are produced. Blocks are mounted in a holder on the table of a special No. 2 dial-type machine built by the Cincinnati Milling Machine Co. The table reciprocates, driving the free-floating spindle through a 16-pitch rack and pinion. The rack is held so it cannot move sidewise or endwise, but can be pushed down against strong springs. This prevents backlash but permits upward table feed of 0.002 to 0.008 between passes. About 20 passes complete two wheels. Rolling is like the kneading described earlier (**AM**, June 12, 1950, p85), has been used successfully to produce sectors and single characters as well

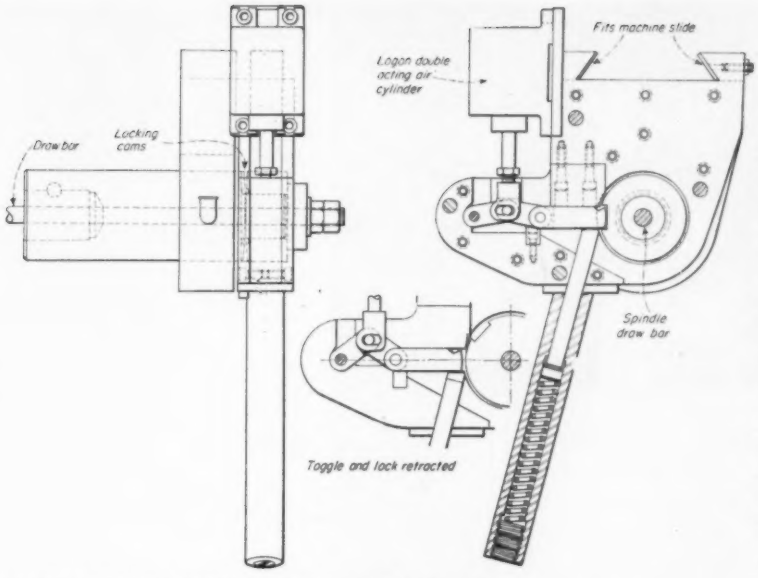




Double matrix for type rolling is of high-manganese oil-hardening tool steel, rough-ground to 0.216 x 1.016 x 1.266 in., engraved, then hardened and drawn to R_c61-63 and finish ground. Originally, all characters were ground in a single strip, but crushing or wear of single characters scrapped the whole matrix strip, and character spacing could not be adjusted. These matrices have lasted for as many as 10,000 wheels, lasting where carbide would not. Characters are engraved with 85° carbide cutters in a Gorton pantographic engraver. Cutter tips are lapped to give the land or face of 0.002 + 0.000 — 0.005 in. required

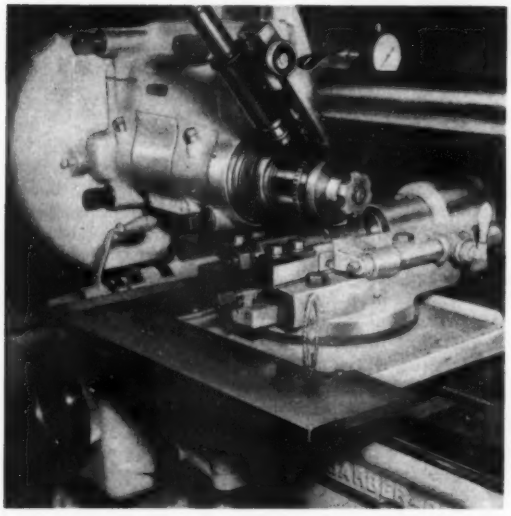


Sturdy support for wheel blanks is essential during rolling to prevent upsetting below the rim proper. So each blank is held between an adapter and a roller, the adapter (top) actually being recessed so the blanked-out portions of the wheel fit over it. Both parts are high-manganese oil-hardening steel, hardened and drawn at 525-550 F, all bearing surfaces being ground after hardening. Rollers and adapters, with the blanks between, are held on a mandrel with a half-turn nut similar to that shown for the hobbing mandrel, but actual pressure is applied by a drawbar separately detailed

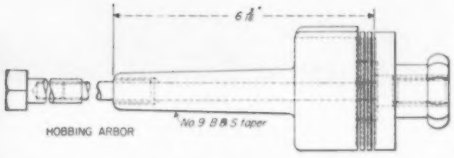


Rapid part removal is provided by this drawbar arrangement. Blanks are mounted at the opposite end of the drawbar and held by collars and a half-turn nut. Then the air cylinder is actuated to draw in the bar through a toggle and cams as shown here. By careful blank positioning within 0.0001 in. of the wheel plane, flanges are made so they can be trimmed to different widths: 0.025 in. + 0.005 — 0.000 on one side, 0.015 in. on the other. This is done by mounting the blanked wheel on a lathe mandrel and trimming with a twin tool spaced to 0.080 + 0.002 —0.000 in. Trimming actually removes part of the sides of the characters

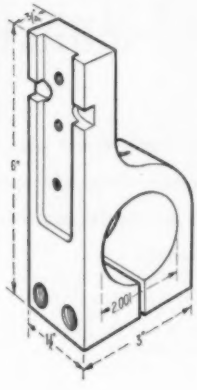
TOOTH CUTTING REQUIRES MICROSCOPE LOCATION



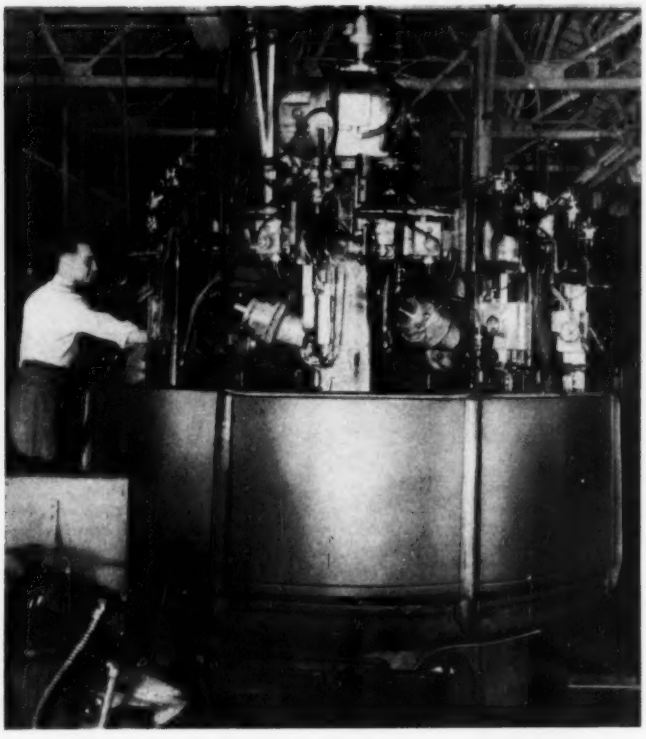
Tooth cutting is done in a Barber-Colman No. 2 gear hobber, two wheels at a time. Location and indexing are critical, because the chamfer on teeth actually touches the bases of the taper on the letters. Location was originally by a pin in the hole in the widest arm of the spider, but this was found inaccurate. Hobbers now have special microscopes so indexing can be done by aligning the base of the character "L" with the crosshair of the scope and line on the mandrel. This has proved accurate within ± 0.001 in. The microscope is a Bausch & Lomb, Model JK-1, with 10x wide-field eyepiece by 2.0x wide-field objective with double vision

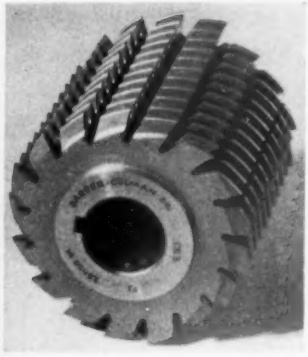


Sturdy support is essential to prevent distortion of work during hobbing. Here are details of the mandrel and spacers. The thumb nut, like that on the rolling mandrel, has ⅜ — 8 Acme thread, cut away in two opposite quadrants so it will clear two matched quadrants cut away on the drawbar. (Threads on the bolt are quadrants less 0.005 in. on each end for clearance.) Thus, with proper spacers, the blanks can be held tightly with only a quarter turn of the nut, yet removed by a reversed quarter turn. Nut and threaded end are casehardened 0.008 to 0.010 in. deep after cutting



This special bracket holds the microscope on the overarm. It is positioned on the overarm and held by setscrew, and provides a solid support for the scope. The microscope remains in position during cutting. Crosshairs in the microscope are matched with one on the mandrel collar by rotating it, then the "L" character on each of the two pieces is lined up. Tenfold magnification makes alignment within 0.001 in. simple





Triple-thread, 4-in.-OD, 4-in-long unground hobs for preshave cutting second-speed and counter gears are semi-topping, with 10° hook, have 17 straight gashes of modified design. Hob tooth profile is corrected to generate a perfect involute, despite hook on flute faces. These hobs are made to ground-hob accuracy

Multi-thread hobs replacing single-thread hobs on this 2-spindle hobber have almost tripled the production rate for Chevrolet transmission gears. Machine has automatic hobshifter heads and pneumatic workholders. Each operator loads two machines

Multithread Hobs Triple Gear Output at Chevrolet-Muncie

Increased feed rates with triple-thread hobs cut costs on transmission gears when multi-spindle hobbers are equipped with automatic controls, and power chucks and centers

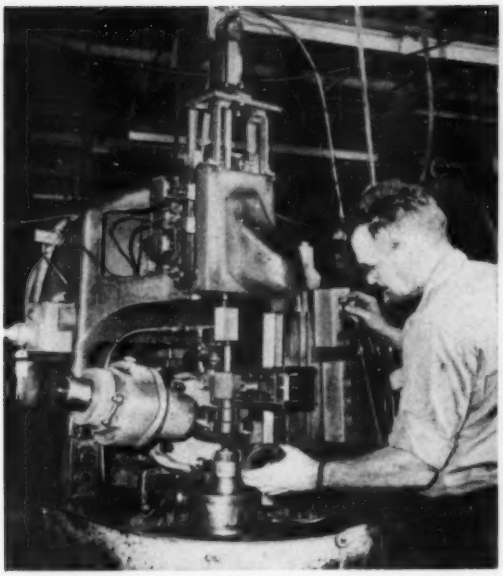
BY JOHN M. FINALLY
Master Mechanic, Chevrolet-Muncie Div.,
GENERAL MOTORS CORPORATION

MAJOR reductions in gear-cutting costs have been effected at the Chevrolet-Muncie plant by disregarding conventional hobbing practice in producing some of the gears used in Chevrolet passenger car and truck transmissions. By using multithread, unground hobs in place of single-thread ground hobs for preshave cutting second-speed and counter gears, costs have been cut to little more than one-third of the previous average.

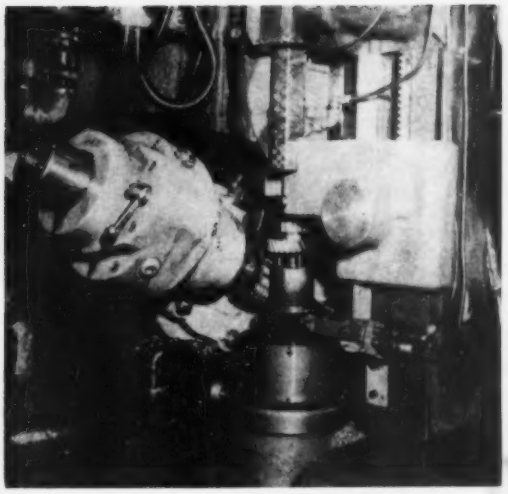
This cost reduction is calculated only on the basis of reduction in time required to hob each gear, and on savings in hob cost per gear cut. It does not take into consideration savings in machine upkeep, floor-space, coolant, power, and taxes chargeable to each operation. Similar savings are expected when the procedure can be applied to other gears used in Chevrolet transmissions.

Despite the fact that heavier feeds are employed in the new setups for second-speed and counter gears, preshave accuracy has not been sacrificed. Lead errors are held within 0.0005 in. and pitch errors within 0.002 in.

When the second-speed gear was cut with single-lead ground hobs on 8-spindle machines, hob speed was 156 rpm, and feed 0.039 in. per rev of the work. Hobs were 3-in. OD, 3 in. long. The gears are forged



Single-spindle hobber equipped with automatic hobshifter head, is used to try out new work holders and pneumatic centers before they are applied to eight-spindle production hobbers. Solenoid valve for pneumatic center is pushbutton controlled. On production machine it will be controlled by cam-actuated limit switches



Work station on eight-spindle hobber for cutting second-speed gears has air-operated expanding collet chuck, automatic air center, and 20 minch (millionths of an inch per rev of hob) hobshifter head. The 26-tooth, 25/32-in.-face gears are cut in a 3.10 min cycle with hob at 156 rpm and feed 0.061 ipr

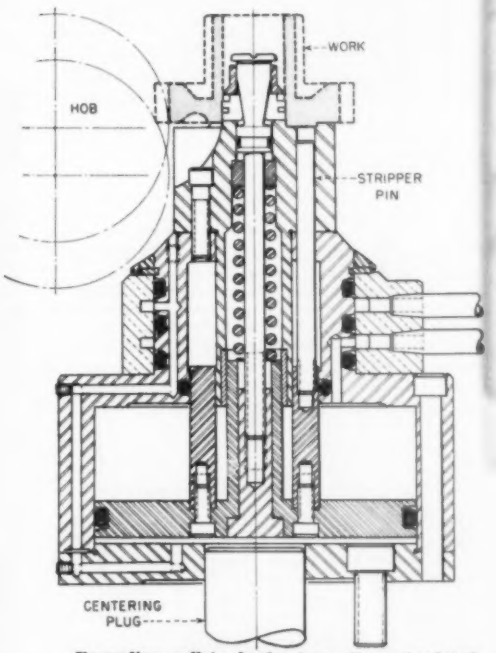
from AISI A-5145 or A-8620 steel, depending on application, have 26 helical teeth of 9.25 normal pitch and 16½° PA. Face width is 25/32 in.

Today, these gears are hobbed at an average rate 2½ times the old rate, using 4-in.-OD, 4-in.-long, triple-thread, unground hobs. Speed still is 156 rpm, but feed per rev has been jumped to 0.061 in.

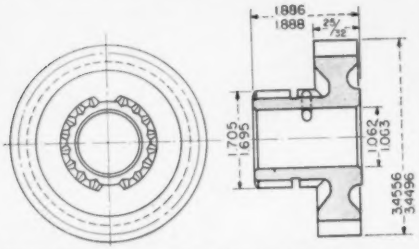
Eight-spindle hobbers are also used for cutting the 22- and 27-tooth gears on the countergear shaft. When the 3-in.-OD, 3-in.-long, single-thread, ground hobs were replaced with 4-in.-OD, 4-in.-long, triple-thread, unground hobs, speed was maintained at 156 rpm, but feed was increased from 0.053 to 0.062 ipr for the 27-tooth gear, and from 0.043 to 0.052 ipr for the 22-tooth gear. Production was tripled. Machines are arranged so the 22- and 27-tooth gears are cut in alternate spindles.

Radical hob design changes had to be worked out before these results could be achieved. By adding two threads in the hob, diameter had to be increased to provide a sufficient number of flutes to give efficient cutting action and finer finish. Axial pitch of the three leads had to be held close enough to produce the required minimum error in tooth profile and spacing.

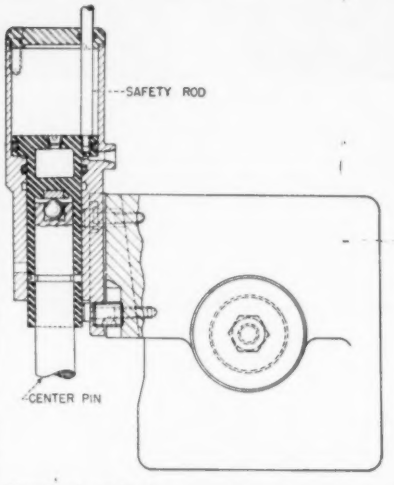
In addition, an unground hob had to be made to



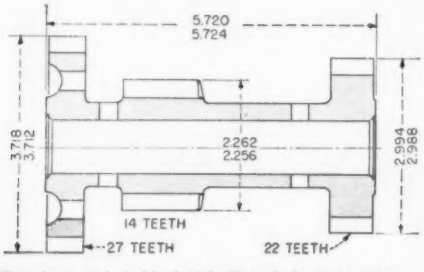
Expanding collet chucks have three hardened steel jaws expanded by downstroke of air piston. As work cycle is completed, air is admitted automatically to lower end of cylinder. When piston rises, jaws are released, then stripper pins raise workpiece off collet for unloading



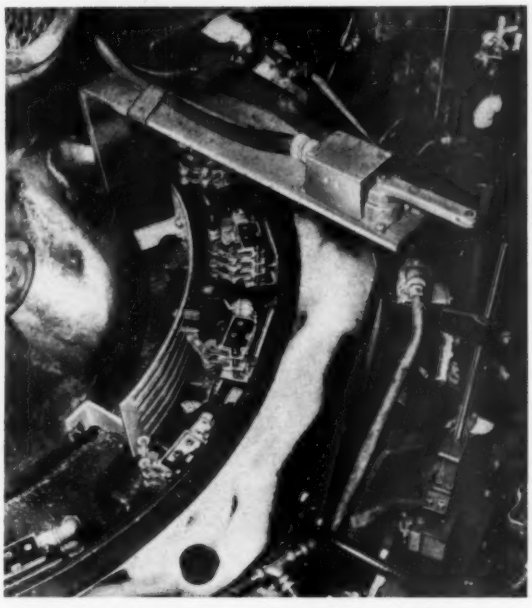
Second-speed gear, forged from AISI A-5145 or A-8620 steel, is hobbed after clutch teeth on hub have been cut in gear shaper. Gear has 26 helical teeth of 9.25 normal pitch and 16½° pressure angle. After hobbing, the gear is shaved and hardened



Cleveland vertical air center unit, modified by adding safety rod which carries, at top, a metal flag to actuate safety limit switch on eight-spindle hobber if workpiece is not held down on collet chuck before cutting cycle starts. Chuck and center are synchronized by cam-controlled limit switches

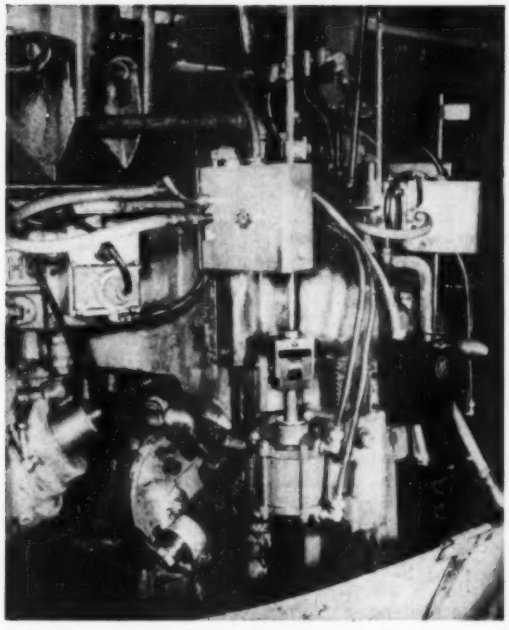


Countergear is hobbed at both ends in same setup on eight-spindle machine. Operator reverses gear to alternate spindles for cutting different ends. The 14-tooth gear in center of shaft is cut in preceding operations. All three gears are shaved and hardened



Slotted cam plate is bolted to center column of hobber so cam blocks can be positioned to actuate Micro Switches which control operation of each collet chuck and pneumatic center in proper sequence. On bracket above switches is limit switch actuated by flag on safety rod above air center

Eight-spindle hobber for cutting 22- and 27-tooth gears on counter-gear shaft has been rebuilt for high-feed hobbing with three-thread hobs. Alternate spindles cut the two different gears. Production is more than triple that with single-lead hobs



Equipped with 20-minch hobshifter heads, the 8-spindle hobber for countergears has air-actuated centers with conventional work locators on vertical spindles. Solenoid valves for air cylinders have pushbuttons so operator can clamp workpiece without waiting for machine to complete its cycle. This gives him sufficient time to operate two machines

ground hob accuracy, with 1 to 1½ points Rockwell C additional hardness. Hob design had to provide additional tooth length, and gash shape was modified to increase cutting efficiency and improve hob life. A 10° hook was added to the flute faces to provide a shearing cut and improve finish. This necessitated development of a new form on the hob tooth profile so a perfect involute could be generated with a flute face offset from radial.

Higher cutting pressures developed by the increased feeds required when using the triple-thread hobs made it necessary to put the hobbing machines into first-class condition. So the 12- to 15 yr-old Model 220 Cleveland 8-spindle machines were completely rebuilt. All worn or damaged gears, shafts, and bearings were replaced, and all worn ways and other bearing surfaces rescraped. In addition, new Cleveland automatic hobshifter spindle heads were mounted, and automatically controlled pneumatic chucking devices were designed and installed.

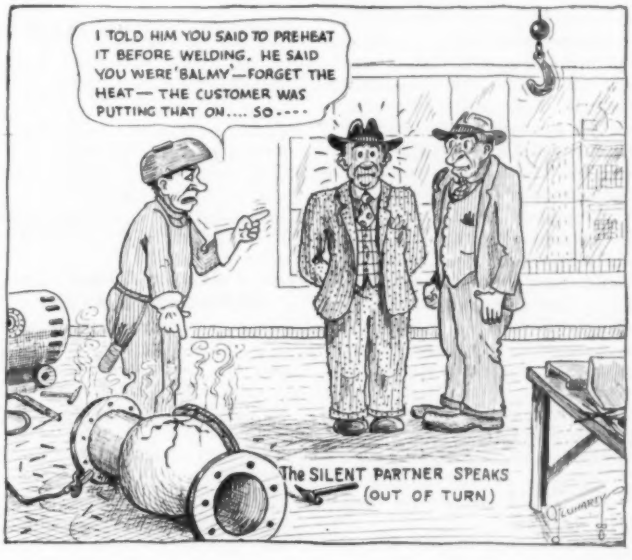
Another factor to which some credit must be given for the increase in hob life and reduction in cutting cost is the use of a shop-mixed cutting oil in place of the soluble-oil coolant previously employed. The present cutting oil is a mixture of all of the reclaimed oils accumulated in the Chevrolet-Muncie plant. It contains a high percentage of lard oil, some sulfurized cutting oils, as well as small percentages of hydraulic and lubricating oils. All these oils are cleaned by centrifuging before mixing. The mix ratio is not constant from day to day. Yet this mixed oil is giving longer hob life between grinds than ever was possible with soluble-oil coolants.

Tips FOR TOP SHOP MEN

380 Politics is worse than a committee if you're planning to get things done. In both recent wars, emergency conditions forced selection of a business executive to cut through politics. Don't let plant politics kill production efficiency.

381 Act your wage. Don't assume airs or living habits that your income can't justify on a long-term basis. By the same token, don't live so far under your income that you get a reputation as a skinflint. Like it or not, you're a model in the store window when you're a boss.

382 Tact, it has been said, is giving somebody a shot in the arm without letting him feel the needle.


I TOLD HIM YOU SAID TO PREHEAT IT BEFORE WELDING. HE SAID YOU WERE 'BALMY'—FORGET THE HEAT— THE CUSTOMER WAS PUTTING THAT ON.... SO----
The SILENT PARTNER SPEAKS (OUT OF TURN)

GOOD CARBURIZING PRACTICE

X...Chemistry Vitally Affects Case Properties

Alloy content of steel affects the concentration of carbon at the surface and the hardness. Type of case produced depends upon the carbon potential of the carburizing medium, and whether it is controllable

BY T. A. FRISCHMAN, Chief Metallurgist, Axle Division, EATON MFG. CO.

UNTIL 1940, it was generally believed that certain alloying elements, and particularly nickel, retarded diffusion of carbon in austenite and thus caused lower case depths. But then Wells and Mehl[1] showed that the diffusion rate of carbon in austenite is virtually unaffected by the kinds and amounts of alloying elements customarily used in constructional steels.

A few years later, Harris[2] demonstrated that case depth is primarily a function of time and temperature. He found that the carbon gradient, or rate of carbon decrease from surface to core, is influenced by the concentration at the surface and the case depth.

Anyone with much experience in carburizing high-nickel steels such as the SAE 2300 series (3.5% nickel), SAE 2515 series (5% nickel) and the SAE 4800 series (3.5% nickel plus molybdenum) is familiar with the lower case depth obtained in comparison with, for instance, plain carbon or SAE 3115 steel (nickel-chromium) under identical conditions of time, temperature and carburizing medium. This circumstance can now be explained in the light of the above findings regarding the effect of carbon concentration on diffusion.

According to these investigators, the diffusion rate, or movement, of carbon in austenite increases with both temperature and carbon concentration. It is difficult to build up high concentration of carbon at the surface of higher-nickel carburizing steels in regular practice. Therefore, it follows that carbon penetration is not as deep under identical conditions as with steels that readily develop high surface-carbon content. Steels containing carbide-forming elements such as chromium, molybdenum, and especially vanadium, come under the latter category.

Data supporting these contentions are presented in Tables I and II. Test bars of different steels were subjected to simultaneous carburization in several types of production furnaces. Desired case depth range was 0.050 to 0.065 in. It is apparent that steels containing chromium, molybdenum and vanadium show higher surface carbon concentration than plain-carbon or straight-nickel steels. Massive carbides were present in the outer surface of the case of SAE 6120 steel, due to carbon content in excess of saturated austenite. Note also the decarburization of SAE 2315 steel for the first 0.005 in. This condition arises because nickel does not form carbides. Once these have formed in other steels, they are difficult to de-

Table 1 .. **Carbon Content of Pot-Carburized Cases**

Depth Below Surface, in.	CARBON CONTENT, % SAE 1020 (Plain Carbon)	SAE 3115 (Nickel-chromium)	SAE 2315 (Nickel)
0.005	1.01	1.12	0.81
0.010	0.96	1.02	0.86
0.015	0.93	0.99	0.85
0.020	0.87	0.94	0.81
0.025	0.78	0.85	0.71

Total furnace time: 16 hr, carburizing temperature: 1680 F
12-in. pots, 9 to furnace, samples in central pot. Compound mixture: 1 part new to 4 parts old

Table 2 .. **Carbon Content of Gas-Carburized Cases**

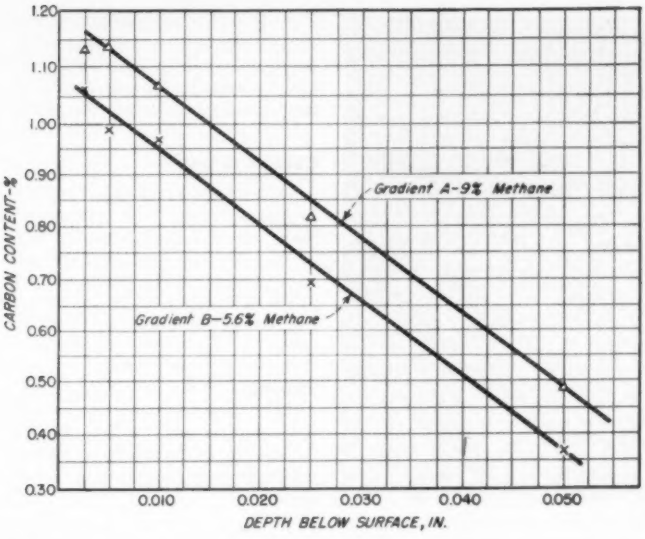
Depth Below Surface, in.	CARBON CONTENT, % SAE 4620 (Nickel-molybdenum)	SAE 6120 (Chromium-vanadium)
0.0025	1.09	1.82
0.005	1.08	1.38
0.010	1.02	1.16
0.025	0.80	0.90
0.050	0.42	0.47

Total furnace time: 13 hr. Carburizing temperature: 1700 F
Carburizing medium: 50% natural gas plus 50% flue gas

Table 3 .. **Stability of "Non-Burning" Compound**

Depth Below Surface, in.	CARBON CONTENT, % First Run	17th Run
0.0025	0.91	0.89
0.005	0.98	1.02
0.010	0.96	1.05
0.025	0.75	0.80
0.050	0.37	0.41

[1] *"Rate of Diffusion of Carbon in Austenite . . ."*, Trans. *Amer. Inst. Mining & Met. Engrs., 1940, p379.*
[2] *"Case Depth . . ."* Metal Progress, *Aug. 1943, p265.*



Methane content of carburizing gas directly affects the carbon content of the case. For SAE 4620 steel carburized at 1700 F, compositions of furnace atmospheres producing the two carbon-concentration gradients were:

	CO_2	O_2	CO	CH_4	H_2	N_2	Natural-gas Dewpoint addition	
Gradient *A*	0.0%	0.0%	16.8%	9.0%	44%	Bal.	+17F	14.0%
Gradient *B*	0.0%	0.0%	18.4%	5.6%	43.1%	Bal.	+19F	11.0%

compose, thereby retarding decarburization.

Carbon Potential

Carbon potential of the carburizing medium exerts a marked influence on the final type of case produced. Obviously, if an atmosphere with a carbon potential of 0.95% is used, the maximum content of the desultant case will be no higher, providing the carburizing temperature is high enough to permit diffusion at a rate equal at least to that of the carbon absorption. On the other hand, if the carbon potential is higher than that required for saturation of austenite, excess carbide will form.

Regulation of the carbon potentials of carburizing mediums is not simple. Usually they are fixed. For instance, solid carburizers are mixtures of several different materials dependent upon each other to produce a definite carburizing action. To reduce carbon potential of the compound by leaning out additions is impractical, because of shrinkage of the working mixture. It is almost impossible to tell when individual or all ingredients are spent.

Some "non-burning" coke compounds continue to show the same activity after as many as 17 consecutive usages without making a single addition of new compound! (See Table III.) Actually, the carbon content is slightly higher for the used non-enriched compound.

Actually, the only foolproof method for regulating the carbon potential of solid componds is to employ a mixture that has a lower carbon potential originally. This practice results in slower action and a longer carburizing period.

The writer is unaware of anyone attempting to regulate the carbon potential of liquid carburizing salts by reducing additions of new salt. Main problems in salt-bath operation are: (1) to keep the bath operating properly, and (2) to get correct case depth by making certain that additions of new salt are made regularly. In practice, these requirements make enough trouble without complicating matters further by trying to control the carbon content of the case. If control of carbon potential is necessary, it had best be done with temperature, diffusion or reheating.

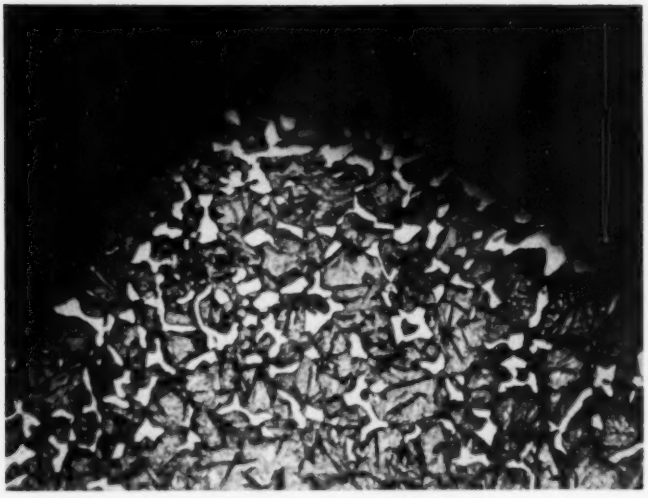
Carburizing salt baths must be kept in proper balance by making regular additions of new salt periodically and also by replacing salt lost in "dragout." In fact, if the dragout is not sufficient, salt must sometimes be bailed out. This practice will keep the bath in proper condition to obtain desired case depth, to hold the range of cyanide content, to maintain the carbonaceous protective cover, and to lessen sludge formation.

Gas-carburizing mediums that do not assist flexible control of carbon potential are: (1) straight natural gas; (2) natural gas and exothermic-reacted gas; (3) propane and air, and (4) propane or butane with endothermic-reacted carrier gas of high methane content. Because of the high methane content, these mediums produce an atmosphere that is in equilibrium with saturated austenite. In other words, their carburizing activity is sufficient for gamma iron to absorb the full amount of carbon of which it is capable.

Controllable Carburizing Gas

An ideal carrier gas, economically produced, for control of carbon potential is the familiar endothermic-reacted gas containing approximately 20% carbon monoxide, 40% hydrogen, balance nitrogen with small amounts of carbon dioxide and water vapor. This gas, with a dew point of 20 F, is in equilibrium with steel of approximately 0.70% carbon content at the usual carburizing temperature of 1700 F. No carburizing action takes place. By adding specific quantities of natural gas, the carbon potential is adjusted to any desired level. A case of eutectoid carbon content can be produced if necessary, thus assuring a full martensitic case upon quenching, without retention of austenite.

Technical control of this controllable gas is absolutely necessary. Gas generators must be checked daily for either carbon dioxide content or dew point. These determinations should be supplemented periodically with Orsat gas analyses of the generators and furnace effluent gas for



"Corner effect," or concentration of massive carbides at corners of gear teeth, cams, etc., is objectionable if the product is subjected to clashing or shock loading. AISI 8620 steel. Magnification, 500X.

determination of carbon dioxide, carbon monoxide, oxygen, hydrogen and methane. As a rule, gas generators produce a gas of definite chemical composition only if the reaction temperature and the air-gas ratio of the mixture to be cracked are held constant, and carbon deposition or sooting of the gas-cracking tubes is controlled by periodic burn-outs.

Various factors affect the potency of carburizing gas. Some of these are: (1) the amount of carbon deposited in the furnace, (2) saturation of the carburizing chamber with the carburizing gas, (3) dew point, or moisture content, (4) rate of flow, and (5) methane content, especially.

An accompanying chart shows the effect of methane content on the carbon concentration and case depth of SAE 4620 steel. These methane values are not given as examples to follow for best carburizing practice, because opinions differ on this score. They do illustrate how necessary it is to control methane content for consistent and uniform results.

Calculated values for amount of methane to be added to carrier gas (in the form of natural gas, propane or butane) often appear in the literature. These calculated amounts are usually insufficient for use in production furnaces, because of such variables as furnace tightness, frequency of door openings, oxidation of trays and work-carrying fixtures, leaks around radiant-tube bulkheads and door frames and efficiency of purging cycles.

Large-production furnaces are currently being operated with methane content as low as 1% in order to control carbon concentration at a sufficiently low level to prevent the retention of austenite upon direct quenching. In such cases, virtually 24-hr control of the gas generators and process is necessary to produce the desired case depth and carbon content without experiencing decarburization or erratic case depth. With a gas of this degree of leanness, the as-quenched work is free from any soot deposit. And, with case depths in the neighborhood of 0.060 in., the hardness upon direct quenching in oil from 1700 F will frequently exceed Rockwell C63.0. In contrast, with cases of the same depth produced similarly but without control of carbon potential, the hardness can be easily reduced to below Rockwell C55.0, but still retains true file hardness.

If carbon potential control cannot easily be regulated, employ either diffusion treatments or a reduction in carburizing temperature, in order to prevent high carbon concentration in the case.

Carbon Gradient

Carbon concentration at the surface and the depth of case determine the carbon gradient or rate of carbon decrease from surface to core material. Thus, the carbon gradient is influenced by the chemical composition of steel carburized and its affinity for carbon. It appears to the writer that pronouncements regarding the ill effects of abrupt gradients have been over-emphasized. Surface carbon concentration and microstructure are far more important than carbon gradient.

Influence of Hardenability

The hardenability of steel is an important factor in influencing case characteristics. Hardenability deals with capacity to take on hardness throughout various sections of mass, whereas hardness is the net result of that hardenability. To illustrate, let us compare a high alloy steel like SAE 4820 and plain carbon steel. When these are carburized and direct quenched, the core of the alloy steel will be harder because of the hardenability imparted by 3.5% nickel and 0.25% molybdenum content.

On the other hand, the case of the alloy steel will not have as high a Rockwell hardness as the plain carbon steel, which has lower hardenability. In general, as the hardenability of steel increases, the hardness of the case decreases, whereas the core hardness increases.

Several factors are influential in increasing the hardenability of steel. Important factors that affect hardenability are: carbon content, alloying elements, grain size and homogenity or likeness throughout of the austenite prior to quenching. As hardenability of the steel increases, the start of the transformation is correspondingly delayed.

Depending upon chemical composition and rate of cooling, austenite may be directly transformed to martensite.

Except when low-hardenability, plain carbon steel is used for carburizing large sections, the case usually quenches out with a basic martensitic structure interspersed with residual austenite. The core transforms to softer constituents.

It will do no harm to repeat that where maximum resistance to indentation and abrasion is desired, high hardenability carburized steels should not be used in the direct-quenched condition. Instead, they should be rehardened if at all possible, freedom from distortion permitting.

Corner Effect

Corner effect, or the result of carbon absorption from more than one direction, is not frequently mentioned in the literature. Nevertheless, this condition is prevalent in many carburized articles. The net result is to build up concentrations of carbides at corners, such as on gear teeth, rollers, bearing races, cams, recessed parts and similar contours. While corner effect may extend only a few thousandths of an inch into the case, it is objectionable if the corner is subjected to clashing or shock loading. This is especially true when final grinding of the hardened part is not contemplated.

Another installment of "Good Carburizing Practice" will appear in the April 2 number.

HOW DO YOU REDUCE WEAR?

IN SPEAKING before the Detroit Section, American Society for Metals, Walter E. Jominy, national president of the society and staff engineer of the Chrysler Corp., posed these questions: What characteristics do you choose in a material for wear resistance? What do you think you need? What do you actually need?

Few people, he said, realize that lack of lubrication can increase wear a million times or more. From his experience the speaker listed eleven conditions which affect wear.

1. Lubrication — what do you know about lubricity?
2. Surface finish — smoothness not always the answer.
3. Load.
4. Speed — more wear usually at slow speed.
5. Geometry of surface.
6. Temperature—more wear at higher temperatures.
7. Abrasives—dirt and grit in lubricant.
8. Motion type—oscillating, rotating or sliding.
9. Nature of mating surfaces—babbit and steel.
10. Initial wear-in.
11. Atmosphere — may be corrosive.

To this list he outlined five types of wear:

1. Cutting—like a file—easiest to cure, remove "file."
2. Abrasive—hard loose particles — provide filter to correct.
3. Galling—particles welded on moving parts.
4. Corrosion — condensate on cylinder walls — repetitive process.
5. Pitting—erosion or fretting — overloading, subsurface fatigue.

He called attention to the research work being done by Burwell at MIT on effect of hardness on wear. The effect of hardness on wear is shown by a formula which Holm developed,

$V = K \frac{PL}{H}$ where; V = volume of wear,

P = load; L = distance traveled; H = hardness; K = constant which varies with composition of materials used. Thus, K would be different for hardened steel on a babbit shell from that when steel runs on a cast iron.

From his experience in the automotive industry, Jominy drew some interesting case histories.

For example for every gallon of gasoline used in a car, more than 10,000 gallons of air must pass through the cylinders. That is why air cleaners reduce abrasive wear. He suggested that more replenishing of oil in the air-cleaner bath would reduce wear more than changing crankase oil every 1000 miles.

Piston-ring life and seal is improved by giving them a coarse rather than superfinish so they will have high spots to *wear* in fast. Once well seated they wear more slowly.

Tests of some 43,000 vehicles show that piston rings last about half as long as cylinder walls. Rings ran from 43,000 to 53,000 miles while cylinders required reboring after 69,000 to 92,000 miles. Chrome-plating top piston ring quadrupled the ring life and it doubled cylinder-barrel life.

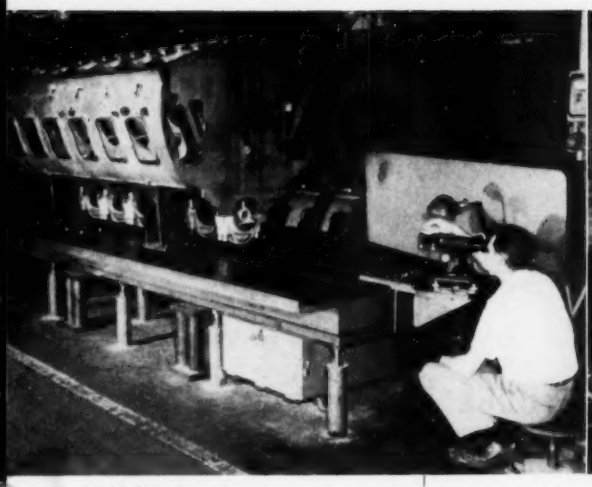
Corrosion from poor ventilation of crankcases and engine operation at low temperature is a serious cause of engine damage. The speaker cited one case where a car was used only a short distance each day, winter and summer. In four years, and less than 8,000 miles of car use, the cylinders and piston rings had to be renewed.

In extensive temperature tests, it was found that an engine run at 104 F average temperature wore five times as much as one that operated at 167 F.

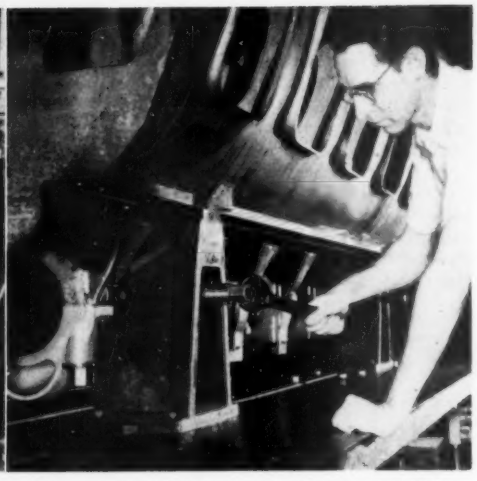
Experience shows that large-grain cast irons increase wear resistance. No other alloy gives as much wear resistance as nickel in cast iron. Shot peening is the best practice to prevent galling. Tin plating is desirable as a "break-in" coat because it is not affected by corosion.

In conclusion, there are five points to keep in mind when selecting materials for long wear life:

1. Higher carbon steels are superior to low-carbon steels.
2. Higher hardness is always desirable.
3. Pearlitic structure is better than tempered martensite.
4. High sulfur content better than low.
5. Hardened cast iron better than normal iron.



Welded-steel crankcases are set up on a 5x15-ft inspection table in close but not precise alignment with the micrometer telescope mounted on an end bracket



Support pedestals have an adjusting screw to bring crankcase bearing bores into approximate alignment with the telescope

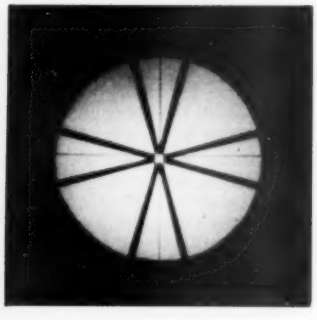
Time to Inspect Bore Alignment Cut 98%

BY WILLIAM JACOBY, Superintendent of Gage Control, Electro-Motive Div., GENERAL MOTORS CORP.

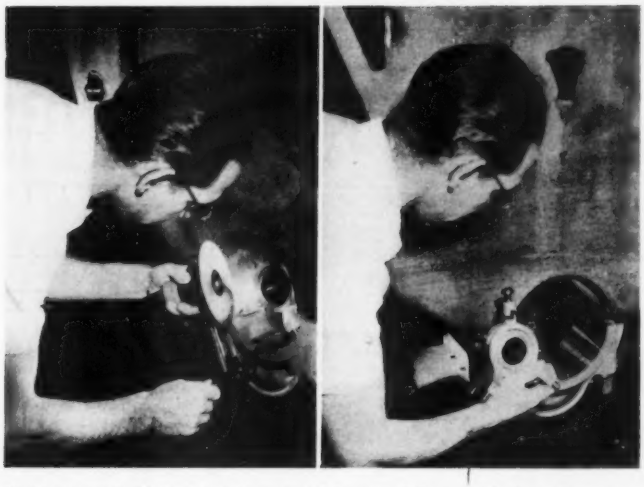
BY ADOPTING optical equipment, one man now inspects alignment of main-bearing bores in diesel crankcases in 20 min. Formerly, two men needed nearly an 8-hr shift to do the same work with conventional length-measuring instruments. Manhour savings figure out to 98%.

Inspection equipment consists of a Leitz alignment telescope with micrometer measuring attachment and precsion target holders of our own design. Diesel crankcases up to 12 ft long are lowered onto pedestals on a 5x15-ft setup table. Precise alignment of the crankcase with the telescope bolted to an end bracket is not essential. The welded structure is jacked into approximate alignment by means of screws built into the pedestals.

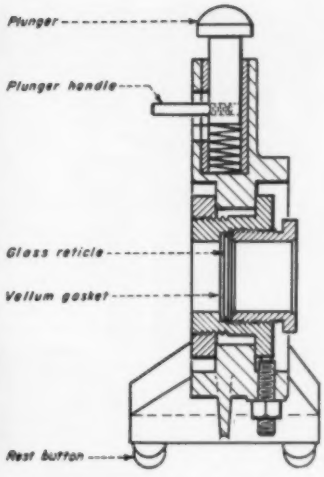
The alignment telescope is *not* an auto-collimator. It has optically centered crosshairs, which are sighted on a target. Illumination is provided by a light source held by



Hairline cross in telescope eyepiece is superimposed on star pattern of target reticle. Micrometer attachment shows telescope movements for centering



Light source (left) is placed in rearmost bore, and its ground glass screen provides uniform illumination. **Target holder** (right) is made of aluminum for easy handling from bore to bore



Accurate positioning of target holder in bore is accomplished by four tungsten-carbide supports and plunger

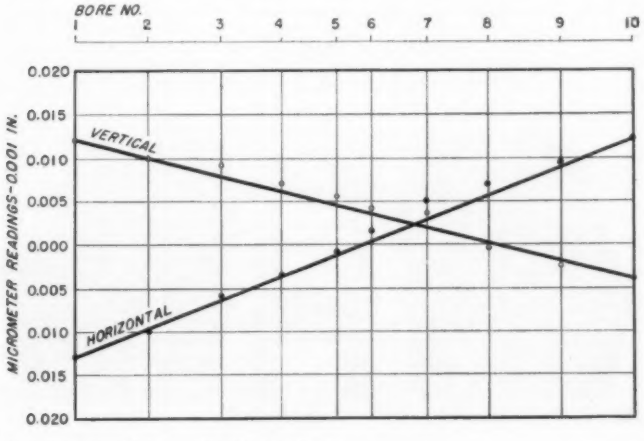
a bracket at the rear-most bore. The target holder is moved from bore to bore and the horizontal and vertical displacements of its reticle center are noted with respect to the previous bore These displacements are obtained by noting the micrometer adjustments necessary to cause the telescope crosshairs to coincide with the center of the target reticle.

To start the inspection sequence, the operator places the target holder in bore No. 1. The telescope is focused on the target. Range of distance settings is from 40 in to 164 ft without affecting accuracy of readings. Next, telescope crosshairs are moved horizontally and vertically with micrometer adjustments until their center corresponds with the target center. Micrometer-dial readings are noted on the inspection form.

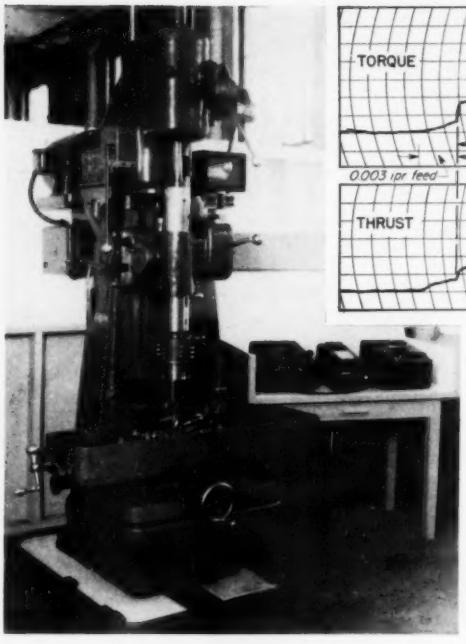
To check misalignment of bore No. 2, if any, the target holder is placed in position, and the telescope is refocused on the reticle. Horizontal and vertical movements of the telescope are again made until the centers of the crosshairs and the target reticle coincide. Micrometer readings are again noted on the inspection form. This process is repeated until all bores have been inspected.

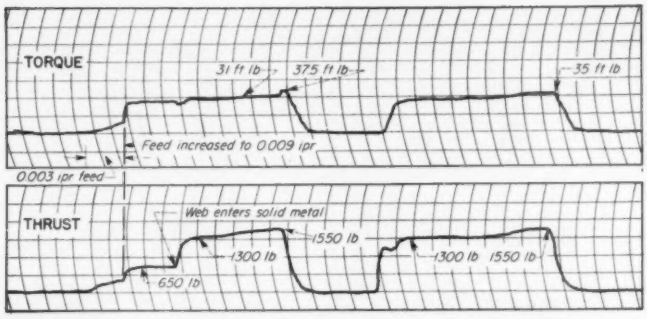
To determine whether the bore-to-bore misalignment is within prescribed limits, a line is drawn through the set of readings for horizontal misalignments and a second line through the readings for vertical misalignments. As the inspection form is ruled in increments of 0.001 in., it is easy to see whether bore to bore deviation is more than the prescribed limit of 0.003 in. horizontally and 0.002 in. vertically.

Displacement measurements are independent of the distance of the telescope from the target and are always in terms of 0.001 in. Adjustment range of the telescope attachment is 0.100 in. either side of zero, both horizontally and vertically. Therefore, the optical equipment has adequate range for any likely misalignment, the alignment with the work can be approximate, and no computations are required.



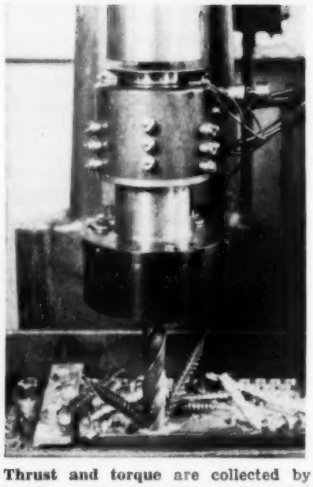
Telescope micrometer readings in vertical and horizontal planes are connected with straight lines and deviations of individual bores are readily noted in 0.001 in. Bores 1 to 10 on the chart form are positioned according to their distances apart in crankcase





SAE3240, heat-treated to 207 Bhn, was drilled with an 11/16-in. drill at 270 rpm to produce these two records. A 0.104-in. predrill for a short depth on the first hole clears the web (0.097 in.) so the doubling of thrust from web pressure can be shown on the first hole. Note that only the thrust is affected. Also, on the first hole, feed was 0.003 ipr for a time, then increased to 0.009 ipr, while on the second it was a constant 0.009

Compactness and portability are attained in this drill dynamometer, designed by Union Twist Drill Co. and here mounted in a Cincinnati-Bickford drillpress. Strain-gage units are inside a sleeve that fits the drill spindle. Torque and thrust are charted separately at right center

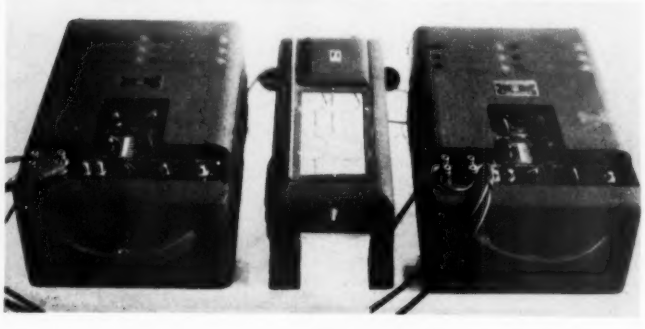


Thrust and torque are collected by brushes in the top collar, and carried to the double-channel magnetic oscillograph amplifiers by shielded wire. The dynamometer can be put in any drilling spindle of No. 4 Morse taper or larger. Torque is measured by strain gages mounted on torque pins that act as cantilever beams. Thrust is measured by similar gages mounted on compression rings which are deflected diametrically by the upward pressure of the drill. This unit is designed to measure torque up to 100 ft lb and thrust up to 5000 lb with accuracy maintained within ± 2%

DRILL STUDY SIMPLIFIED

Electric strain gages make possible a portable dynamometer in the spindle. Unit separates torque and thrust, gives direct readings

Two Brush universal strain analyzers amplify the strains so they can be recorded on the magnetic oscillograph between them. Unit at left picks up torque, that at right the thrust. Thus forces are instantaneously recorded as a function of time, the sluggishness and error of sliding contacts are avoided, and units are both stiff and sensitive



HOW TO SPIN METALS

BY JOHN W. LENGBRIDGE,
P.E., ASME

Metal spinning is one of the few remaining legacies of the ancient metalworking art still practiced in this machine age. The process is largely dependent on manual skill and, when seen for the first time, is like a colorful glimpse into the past. Unlike drawing, in which the change of shape is hidden by the tooling, shaping by spinning is completely visible throughout the operation. A rapidly revolving disk is seen to flex and flow into the shape of a vase or bowl, in a matter of moments. In almost every line of endeavor, partial or complete mechanization tends to replace manual skill, and even spinning has felt this influence to some extent, but not perhaps as much as other metalworking operations. Many articles are still produced entirely by hand spinning, mechanical aids being necessary only for thick, tough metals.

The rapid growth of the pressed-metal industry, although largely replacing spinning, has not eliminated its usefulness. The process followed along, fitting in here and there either as a basic, or as a supplementary operation and, with some mechanization, it still holds a useful place in industry.

In European countries and some other parts of the world, spinners are required to go through a long apprenticeship to acquire the all-around skill customary in those countries. In North America the tendency is to eliminate the highly skilled parts by mechanization and make it a popular occupation for the average workman.

In this report are presented a method of estimating costs of spun versus drawn products, spinnability ratings for various metals, and basic information on the design of spun products. Important data are also given on the actual technique of spinning, the tools and equipment required, and the various production methods employed.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRY

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WHEN TO SPIN

SPINNING is limited to products which are circular in cross-section at right angles to the axis of rotation, except for some minor work which may be done on ovals. The scope of circular products, insofar as diameter, thickness, and metal toughness are concerned, is limited only by the size of the equipment and the power available to make the metal flow. The mechanical spinning of steel tank heads by Lukens Steel Co., Coatesville, Pa., is perhaps one of the best examples of large work. One recently described had an OD of 21 ft 6 in. and a thickness of 1 1/16 in., spun from a 276-in. steel blank. Smaller heads 6 in. thick have been spun.

Greatest Uses

By far the greatest use of spinning is in the production of such items as utensils, reflectors, covers, corona shields and holloware. But it is also a useful aid in performing supplementary operations such as the trimming, beading, ironing, and rolling of circular press-drawn products.

In general, spinning is an alternative to drawing for producing certain classes of hollow vessels and, before deciding on either method, there are several factors to be considered which may influence the choice. Assuming that machine equipment is on hand to produce an article by either method, the following points should be investigated:

(1) Tool cost per unit (This will vary with lot size).
(2) Labor and overhead costs per unit (This is more or less constant, regardless of lot size).
(3) Delivery requirements.
(4) Contour problems such as re-entrant curves.
(5) In the case of spinning, the possible use of existing standard press tools for breakdown operations.
(6) Dimensional accuracy of the product and the limits of either process.

Spinning is predominantly a manual operation and, as such, usually involves high labor costs per unit. The nature of the operation, however, permits simple and economical tooling. Drawing is a mechanical operation requiring more costly tooling but capable of much lower labor costs per unit than spinning. These components of the cost factor must be analyzed in relation to lot size before a comparable cost can be arrived at. As tool costs vary with quantity, and labor cost is constant, the variable in spinning is the low component, and in drawing, the high component. Therefore, the unit cost of a stamping would drop more rapidly than that of a spinning as the quantity is increased. However, up to a certain point in the quantity scale, the high cost of press tooling may bring the unit cost above that of spinning, and it is this demarcation point in the quantity scale which must be determined when analyzing the probable costs.

Fast Delivery

Delivery is often a critical factor. Spinning tools can be built in much less time than draw tools, and this permits earlier deliveries; hence the overall time consumed in both tooling and producing must be considered.

Re-entrant contours are often more easily produced by spinning than by drawing, and although the labor cost of spinning may be higher, the tool cost will be less. If, however, the quantities are large enough to absorb a substantial outlay for tooling, the lower labor cost of drawing becomes a favorable factor. The possibilities of repeat orders is another point which must not be overlooked. If future orders of large quantities are a reasonable possibility, the economics are changed somewhat. Tooling is usually absorbed on the first order and is not a factor on repeat orders; this would give drawing a decided cost advantage. The effect of including future possibilities into the calculation is to lower the demarcation point which determines when drawing becomes more economical.

Cost Factors

Curves in Fig 1 are based on typical costs of producing a 6-in. dia, 6-in. deep beaded aluminum shell by both processes.

In the upper chart, the full lines represent drawing costs, and dotted lines spinning costs. The lower lines represent tool costs only, the upper lines being total unit costs including tools, labor and overhead.

The rate of change per increment of quantity on both tooling curves determines the rate of change in the unit cost curves, because production costs are reasonably constant for any quantity.

The crossing point of the unit cost curves is the quantity demarcation point beyond which it becomes more economical to draw. In this particular case, costs are about the same at 2300 pieces. At 5000 pieces the cost of drawing is about half that of spinning. Hence, unless other circumstances are present to affect the choice of method, it would be more economical to spin quantities less than 2300, and to draw quantities above 2300. Details of the unit cost of an item in two different quantities are tabulated on the chart.

The lower chart shows that production may be started earlier in spinning because of the shorter tooling time. However, when quantities are large, the faster production rate of drawing can favorably affect delivery, notwithstanding the longer tooling time.

Selection of Metals

The range of metals which can be spun has been widened considerably through improvements in equipment, tools, and technique. Standard products are now being spun from aluminum, magnesium, brass, copper, silver, carbon steel, stainless steel, nickel, Inconel, Monel, zinc, pewter, and lead. Some present more difficulties than

others, but, with suitable equipment and know-how, they can all be worked on a production basis.

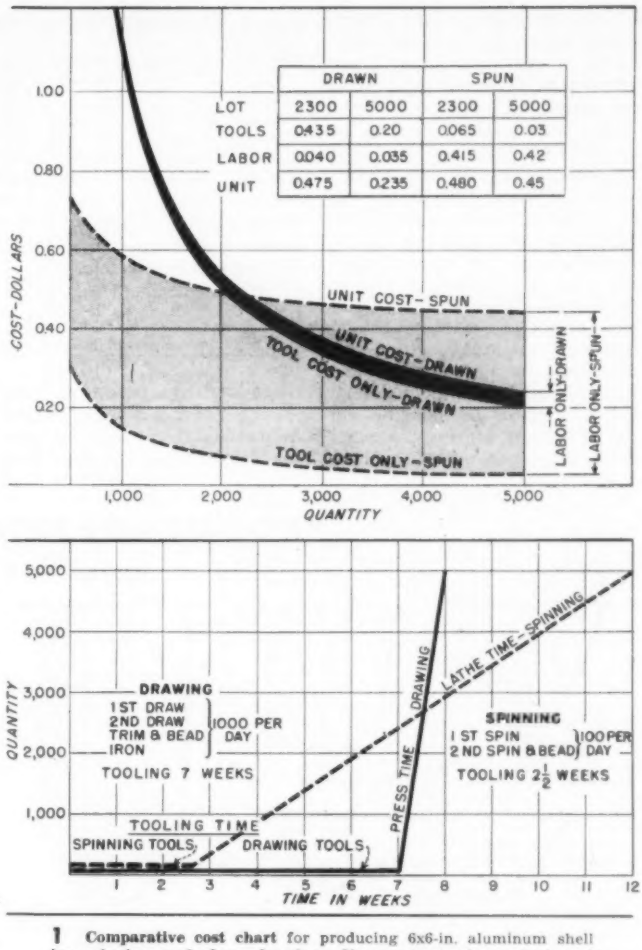
Selection of metal for a spun product depends upon the customer's specific metal requirements; that is, steel, aluminum, magnesium, etc.; desired properties in the product, such as strength, corrosion resistance, finish and lightness; structural proportions; and spinnability, as it affects cost.

Specifications

The customer usually specifies a certain type of metal, consistent with end use of the product. This does not necessarily limit the choice to one kind of metal, and quite often a change in specifications will result in a cost advantage at no sacrifice to utility. Structural proportions are a factor of both cost and strength. Deep, thin-walled spinnings are costly to spin and, unless ribbed, lack stiffness. Thick-walled spinnings involve mechanical equipment, and often heat, to accomplish shaping, thus adding to the unit cost. Materials which can be easily worked generally involve less labor cost per unit than tough materials.

Aluminum alloys 2SO and 3SO are perhaps the most spinnable of all metals and can usually be given very severe cold work without annealing between operations. Alloys 57SO and 55SO follow closely in spinnability, but with these alloys deep spinnings may require an intermediate anneal. 17SO and 24SO alloys can be spun to produce a strong product, but require more careful technique.

Magnesium alloys have excellent spinnability; however, with this metal all but the simplest spinnings must be spun hot; and if the spinning is deep, the special setup and temperature control tend to add to the cost. For deep spinnings, chuck and metal must be heated to between 500 and 600 F during the operation, and because of the high coefficient of thermal expansion the chucks should be made about 0.005 in. per in. of diameter larger than the shell size required. Copper alloys, steels, stainless, and the nickel alloys all have fair spinnability at room temperature, but for certain operations on these metals, hot spinning is essential.



1 **Comparative cost chart** for producing 6x6-in. aluminum shell by spinning and deep drawing. Upper chart shows tool and labor costs; lower chart indicates tooling and production times

Spinnability

The high formability possible by spinning results from the progressive nature of the operation, which is equivalent to many successive drawing operations, but the adaptability of a metal to spinning is dependent, with a few exceptions, on its plasticity at room temperature.

Spinnability is directly proportionate to ductility, and a metal which can be deep drawn can usually be deep spun. In general, this fact can be used as a guide in selecting metal for spinning. Metals which are difficult to draw may often be spun but may require more power, and possibly the use of heat during spinning, or annealing between operations. Blanks which are extremely thin in relation to diameter are quite difficult to spin because they tend to wrinkle freely. The ductility of some of the tough steels and alloys can be maintained only by frequent annealing, and when heat or annealing is necessary costs go up. The internal stresses are less in hot spun products than in those spun cold. Aluminum, copper, bronze and some steels respond quickly to hand spinning and can be made

into a wide range of products. Soft ductile metals can be spun closer to the chuck than hard metals which tend to spring away from the chuck.

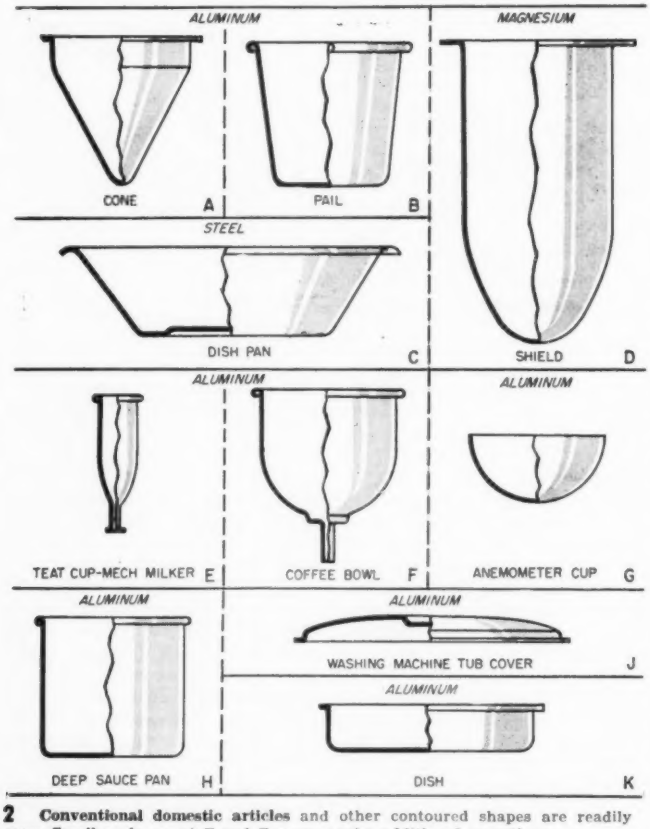
To tabulate this property of spinnability, Spincraft, Inc., has done considerable work on various alloys and tempers, and has arrived at an approximate spinnability rating for each. These are listed in Table I, and the figures shown are based on a numerical value of 1.00 for aluminum alloys 2SO, and 3SO, which are rated as having maximum spinnability. It is evident from the low values shown for some of the metals that they are not suitable for spinning. On the other hand, some of the tough metals show good spinnability. Low values would indicate high costs, due either to difficulties in making the material flow under the spinning tools, or to special setups. High values would indicate low spinning costs because the metal is capable of being easily worked to shape.

Table I . . **Spinnability Ratings for Various Metals**

	SHALLOW	DEEP
GROUP 1. ALUMINUM, MAGNESIUM		
2SO Aluminum	1.00	1.00
3SO Aluminum	1.00	0.995
52SO Aluminum	0.98	0.62
17SO Aluminum	0.65	0.45
AM 3SO Magnesium	0.55	0.45*
MA Dow Metal	0.55	0.45*
* Special setup for hot spinning.		
GROUP 2. STEELS		
CR deep-drawing steel	0.91	0.91
HR pickled drawing steel	0.91	0.73
Galvanized sheet	0.82	—*
* Coating will flake.		
(Courtesy, Spincraft, Inc.)		

	SHALLOW	DEEP
GROUP 3. COPPER-BASE ALLOYS		
CR copper, annealed	0.87	0.87
Yellow stamping brass	0.86	0.86
Everdur 1010	0.84	0.74
Soft-temper phosphor bronze	0.74	0.40
GROUP 4. NICKEL & NICKEL ALLOYS		
L. nickel	0.67	0.60
Monel	0.64	0.54
Inconel	0.63	0.34
GROUP 5. STAINLESS ALLOYS		
18/8 - 347	0.70	0.70
14/18 - 430	0.70	0.57
18/8 - 304	0.67	0.67

PRODUCT DESIGN



2 Conventional domestic articles and other contoured shapes are readily spun. Small necks, as at *E* and *F*, may require additional operations

THE design of spun products involves a consideration of several factors, and it is assumed that, before proceeding with the design, the cost picture has been studied and the decision made that spinning is the logical method of manufacture. A few of the factors to consider are spinnability, contours, decorative features, and limits.

Metal spinning is essentially the application of pressure with a suitable tool or roll against the surface of a rapidly revolving disk. Consequently, it is more or less limited to circular cross-sections. Within this category, spinnable contours are almost unlimited. Deep containers, straight, tapered, domed or annular contours, and reentrant shapes, all come well within the range.

Open Contours

Tapered shapes similar to those at *A*, *B* and *C*, Fig. 2, are typical utensil contours often produced by spinning. Domed shapes like those shown at *D*, *G* and *J* for miscellaneous purposes, are also often produced by spinning. Contours having small necks like those at *E* and *F* present considerable difficulties at times because of the additional operations necessary to work the metal down to relatively small diameters. Parallel-walled shells like those at *H* and *K* are

more difficult to produce by spinning than tapered or domed shapes. This is because the metal must be moved through a longer unsupported distance before reaching the support of the chuck. This is illustrated in view *C*, in which the metal for the dish pan is moved through about 45°, as compared to 90° had the walls of the shell been parallel. It is interesting to note that in drawing operations the reverse is true. Parallel-walled shells can usually be drawn in fewer operations than tapered or domed shells.

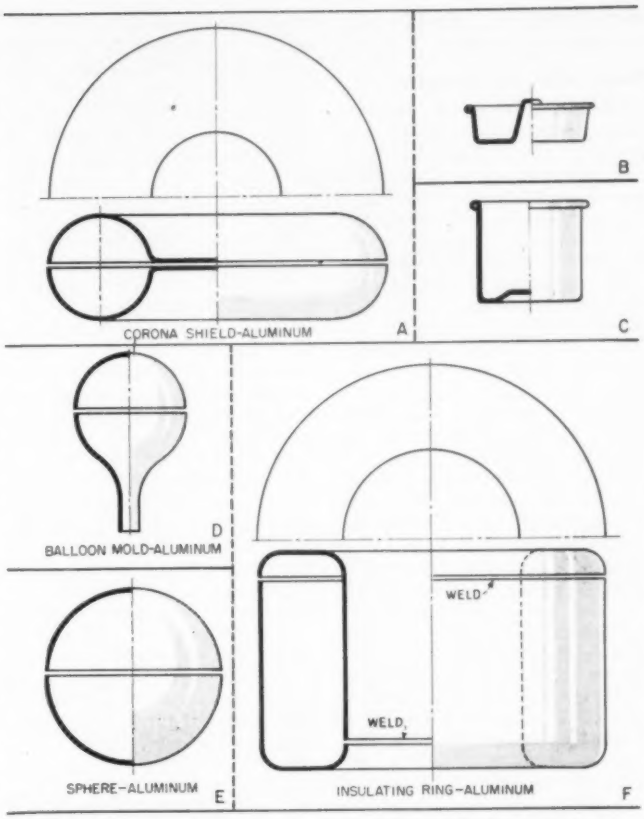
Closed Contours

When making shells which must be matched in pairs, such as those shown in Fig. 3, it is well to pair them up as production proceeds. In hand spinning the flow of metal is the result of manually applied pressure and tool manipulation, which may vary from hour to hour and even from shell to shell. This factor may cause diameter variations which can accentuate assembly difficulties.

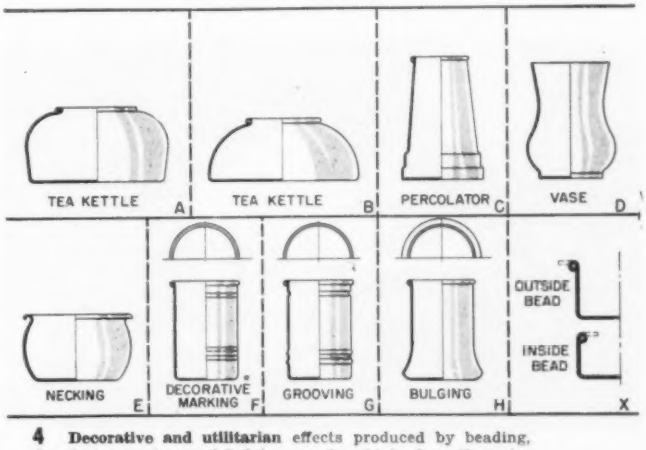
The two shells *B* and *C* illustrate reverse-bottom shells. When the inner contour is deep it is spun first, then the outer contour is spun on another chuck. If the inner contour is shallow, similar to the one shown at *C*, it is often possible to spin the center on the same chuck and in the same operation used for the body contour.

Re-entrant Contours

The shells shown in Fig. 4 are typical re-entrant contours produced on a spinning lathe by use of sectional chucks or internal rolls. Some of these shapes can be spun only on sectional chucks; others can be spun on either chucks or rolls. Contours similar to those at *A*, *D* and *E* may be spun either on sectional chucks or internal rolls. Those at *B* and *C* are limited to sectional chucks. Regarding re-entrant contour spinning on chucks and rolls, mention should be made of spinning such shapes on air only. Here and there in industry may be found a spinner who, by reason of exceptional skill and experience, can spin these contours without the aid of either sectional chuck or rolls. Such men are rare and, except for the making of



3 **Two-piece assemblies** are often produced from spinnings, but should be paired as production proceeds to avoid variations caused by manual operation. Reverse bottoms, as *B* and *C*, are produced without difficulty



4 **Decorative and utilitarian** effects produced by beading, flanging, grooving, and bulging can be obtained on the spinning lathe, usually on the same chuck employed for forming. Inside beads, *X*, however require a separate operation

single models, the method is seldom used in production.

Beads, Ribs, and Flanges

Operations such as beading, flanging, and grooving on circular products are well adapted to spinning lathe equipment. The stiffening effect of beads, flanges and ribs adds useful strength to the product as well as improving the appearance. An outside bead at the open edge of a shell adds as much strength as a flange, and is more safely handled. Ornamental designs and knurls improve the appearance of the product and can often be applied by rolling. A bulge base similar to that shown at *H* (Fig. 4) can be formed by pressing as well as by rolling.

From a fabricating standpoint, outside beads are preferable to inside beads. If the bead is on the outside, as shown at *F*, it can be formed on the same chuck and in the same operation as the one used for the body spinning, but if beaded on the inside, extra tools and separate operations are necessary. In addition, the bead metal offers more resistance when made to flow to a larger diameter, as when forming an inside bead, than when made to flow to a smaller diameter. This is illustrated at *X*.

Short changes of contour and sharp radii should be avoided because of the tendency to split from thinning. Data found in bend radii tables are usually suitable for average work. Ribs and grooves should have liberal radii, not less than three or four times the metal thickness.

Weight and Finish

The weight factor must not be overlooked, particularly when the product is substantial in size. Large chucks often mean high machine maintenance costs. In addition, fatigue becomes a factor when heavy shells must be handled all day. Shipping costs may also be high. The use of aluminum or magnesium may be preferable from the weight standpoint.

Finish requirements are a factor as regards both appearance and cost. Metals of high spinnability can usually be given a higher spun finish than those of low spinnability. Metals requiring most power to spin are more difficult to finish smoothly. On the other hand, metals of high spinnability are more susceptible to grooving by careless or inexperienced spinning. If the use of heat during spinning, or annealing between spinning operations, is necessary, scaling may affect the quality of finish obtainable and add polishing expense to the cost of the product. A flash copper plating on steel tends to reduce friction during spinning and permits a better finish.

Size Control

Size, thickness and type of metal used for the product determine the limits of method, that is, hand spinning or the need for partial or complete mechanical application of the tooling. In hand spinning, the variables in the human element place some limit on the uniformity of size and quality, depending upon spinner skill, kind of chucks, and type of material being spun. Soft metals respond more quickly to spinning pressure than do tough metals, and will tend to vary more in size and thickness after spinning. Small, shallow work can be spun to closer tolerances than large, deep work, and in both classes the tolerances will vary again with the type of metal used. For average spinnings of good spinnability $\pm$ 1/32 in. is often obtainable; small, shallow work may be held even closer. In general, however, it is better for the designer not to specify limits any closer than is absolutely necessary, because of the hand-made nature of the process and the many variables, as well as the fact that it costs more to work to close limits.

TECHNIQUE OF SPINNING

5 **Spinner at work,** forming a deep aluminum shell. Note the method of holding the tool. Left hand grasps the toolpost and holds the tool down; movement is supplied by swinging the entire body

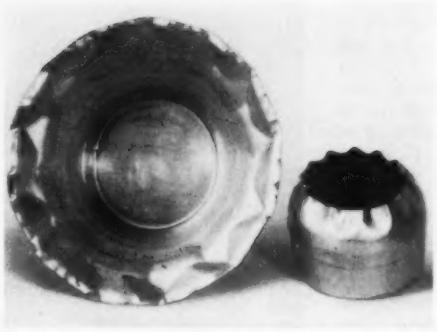
THE actual method used to form a holloware vessel from a flat blank in a lathe may be either manual or mechanical, and in each case a procedure is followed which, through repetition, becomes almost automatic to the operator. This is the technique. The knowledge of how and when to vary the technique to overcome problems of method, metal, shape and finish may be described as experience. Part of this experience is the know-how of reductions, blank calculations, spinning speeds and lubricants.

It might be well to point out here that the stance used by spinners in different parts of the world varies considerably. In North America, spinners like to stand at their work. In Europe, spinners

customarily lean into a belt, like telephone linemen. In India, particularly on small work, the spinners squat on a bench level with the chuck, and use both hands and feet to manipulate the work.

A highly skilled spinner can build up or reduce thickness almost at will, particularly on metal of high spinnability. An inexperienced spinner may reduce thickness at the wrong places, or produce alternate thick and thin bands, thereby lowering the stiffness and quality of the product.

Uniformity of size, contour and finish on different types of metal, and varied contours, along with steady production rates, are mute evidence of a spinner's experience and ability.



7 Wrinkling of the metal, instead of a smooth flow, is produced when the spinner loses control by trying to force it down to the chuck too rapidly

Hand Spinning

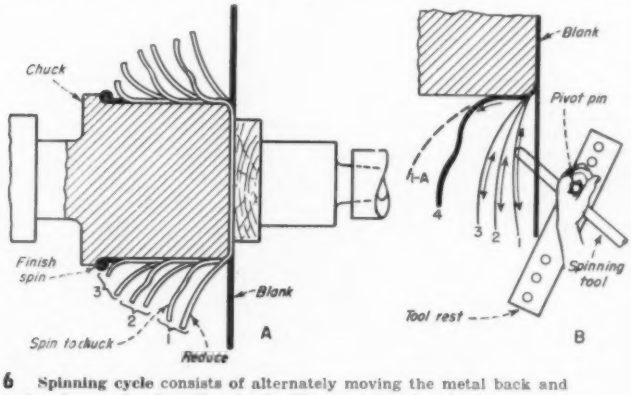
Each spinner develops his own particular style, but in general the procedure is as follows: The blank is placed against the bottom of the chuck and clamped between the chuck and the tailblock. The tool rest is adjusted so the working end of the tool will make contact below the horizontal centerline of the blank. The handle of the tool is held under the spinner's armpit and, levering the tool against the pivot pin, the spinner applies pressure across the face of the revolving disk. The metal is worked up from the bottom toward the open end of the shell in a series of long and short sweeps, semi-circular in direction. The long sweep moves a band of metal toward the chuck, and the short sweeps lay part of that band down on the chuck.

This cycle, illustrated at *A* in Fig 6, is repeated until the shell is completely spun. The blank is shown in the starting position and the successive steps are each shown in two stages, the first illustrating the result of the long sweep, the second showing the metal being laid down to the chuck. It is essential that the spinner overlap each step in the procedure to produce smooth contours.

At *B* the first step is further broken down to show the action in detail. The tool rest is suitably located, and, with one hand gripping the pivot pin and resting on the spinning tool, the spinner moves the tool backward and forward along the face of the revolving disk, gradually making it take positions 1, 2, 3, 4, etc. This backward and forward action is necessary because the outward sweep tends to reduce the metal thickness and the return sweep tends to build it up again. During this stage of the operation many spinners use a back stick to minimize the buckling tendency. The back stick is a hardwood paddle held behind the disk and moved in such a manner that the spinning tool, when brought to the edge of the disk, makes contact with the paddle. The lower portion of the dished shell is then spun down to the chuck as indicated by line 4. Broken line 1-A is the first part of the next step. In working the metal down to the chuck it may be necessary to occasionally change the pivot pin to a more convenient location, and even to change the position of the tool rest. The important thing is to maintain control of the metal flow at all times.

When the last area band has been worked down to the chuck, the spinner places the flatter side of the steel spinning stick close to the bottom of the side wall and, hitting the bottom hard to prevent backup, moves the tool with a long sweep and irons as much length in one stroke as he can cover to size and finish the shell.

With soft metals it is generally best to keep a slightly reversed flange on the edge of the blank to prevent kinking, which will also occur if the metal is moved too fast. Occasional trimming is necessary to remove the tears and edge cracks which appear. The metal work hardens as the spinning proceeds, and edge cracks will open up towards the end of the operation if not removed by trimming. Holding the tool too long in one



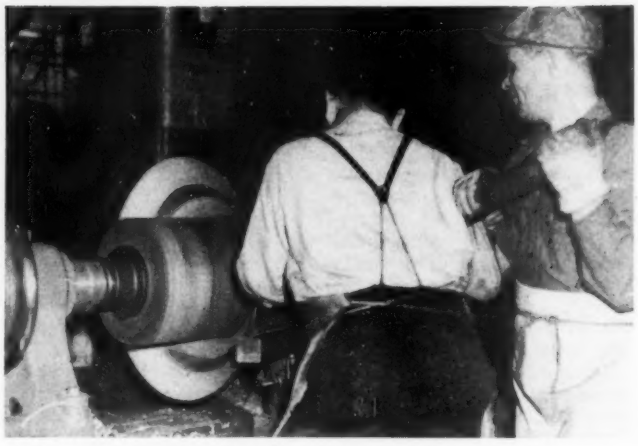
6 Spinning cycle consists of alternately moving the metal back and laying down a band on the chuck. First step requires long sweeps of tool, second step takes short sweeps. Operation is shown in detail at *B*

place causes excessive work hardening, and too much variation in pressure applied by the tool will result in wall thickness variation. When the metal ceases to flow, spinning should be stopped and the shell annealed after removing all lubricant.

Mechanical Spinning

The process generally lends itself to a certain amount of mechanization for mass production under certain sets of economic conditions, and there is much scope for development of ingenious automatic and semi-automatic spinning equipment.

Thick or tough metals usually require pressures far in excess of human brawn, and for these applications semi-mechanical or fully mechanical means are used to apply the pressure. As the thickness and temper of the metal increase, the greater is the need for mechanical aids for the spinner. With metals of high spinnability sufficient power may be obtained by using two men for breakdown operations.

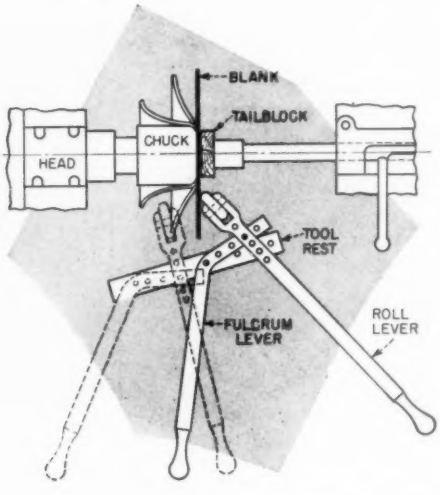


8 Extra power for breakdown on heavy materials of high spinnability can be obtained by using a second man on the end of the spinning tool. Part shown is a deep container made from 0.091-in., 2SO aluminum

A useful semi-mechanical accessory is the compound spinning lever shown in Fig. 9. This consists mainly of a fulcrum lever and a roll lever. Pressure is applied by the fulcrum lever, movement by the roll lever. The pressure is multiplied by leverage so that two or three times the applied pressure can be exerted from the roll to the work. In addition, the center on which the roll lever pivots can be moved as the work takes shape. The holes on both levers and on the tool rest permit a wide adjustment of position and leverage.

Fully mechanical spinning may be accomplished by using screw compounds to apply pressure, and quite thick metals can be made to flow by this means. It is, of course, slower because the transverse and cross slides must be repositioned

10 Largest spinning on record is a steel tank head made by Lukens Steel Co. Material is $1\frac{1}{16}$ in. thick, finished dia is over 21 ft 6 in. and weight is 20,000 lb. Spinning is done hot on a special machine



9 Compound spinning lever is useful accessory for obtaining additional pressure on heavy material. Holes in levers permit wide range of adjustment for position and leverage

more frequently so the tools will follow the changing shape of the blank.

Breakdown Procedure

In any cold-working operation on metal the flow must be controlled to produce the desired results, and this is particularly true of spinning. To maintain control it is often necessary to break the spinning down into several steps or operations, and a few of the factors which determine the need for extra operations are: the height to diameter ratio, h/d; the spinnability and thickness of the metal; the contour of the shell; and the skill and experience of the spinner.

With metals of good spinnability and of a thickness capable of being hand spun, the ratio of shell height to diameter may be used as a general guide to the number of operations required, provided other factors do not add to the difficulties of working the blank to shape. If the ratio is high, there will be a relatively large area of metal to be worked and, to maintain control of flow, one or more breakdown steps may be necessary. If the ratio is low, there may be no difficulty in spinning the blank to shape in one operation.

Spinnability and thickness are important factors. A metal which is tough will not respond as easily to the manipulation of the spinning tools as one which is highly plastic and, as the thickness of the blank increases, it will be more difficult to work and will necessitate additional operations. Very thin blanks may require more careful spinning than blanks of average thickness, even to the extent of extra operations, because of their higher tendency to wrinkle.

Regarding the effect of contour on the number of operations required, it should be noted that a certain amount of spinning on air is necessary on almost every spinning, and when large areas of metal are spun without the support of the chuck, it is more difficult to control and must be worked more gradually.

It has been mentioned that parallel-walled shells are more difficult to spin than those with tapered walls, and this is simply a matter of metal control. When spinning such shapes, tapered and domed contours are easier to work than parallel-sided shells because better control is possible. In other words, less air-spinning is necessary on tapered and domed shapes because chuck support is reached sooner, and thus these contours usually require fewer operations.

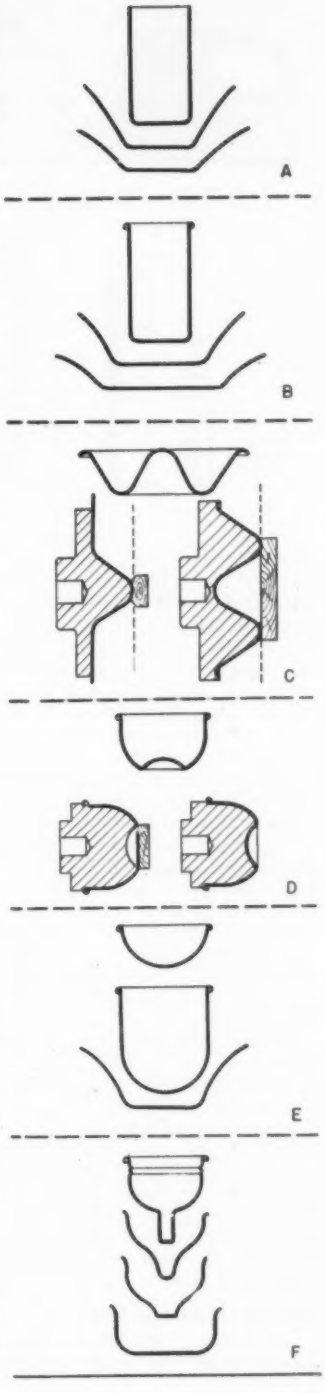
Spinning is an operation of individual performance, and two spinners rarely produce identical results even on the same job. For this reason, skill and experience also affect the number of operations necessary to produce a specific shell. On substantial runs, a group of spinners will become more consistent, but variations in contours, thickness, and finish will occur. A spinner with broad experience on various metals and shapes will produce the most consistent work, can often eliminate an operation, and will keep scrap down to the minimum. The figures shown in Table II are typical of average requirements for hand-spun shells using 2SO, 3SO and 57SO aluminum. They should be used with caution, however, because of the effect of some of the other factors mentioned.

A few spinnings requiring several operations are shown in Fig 11. At *A* and *B* are two spinnings each requiring three operations. The one at *A* is thick walled, the one at *B* is the same diameter and

Table II . . Number of Operations from Blank to Finished Shell

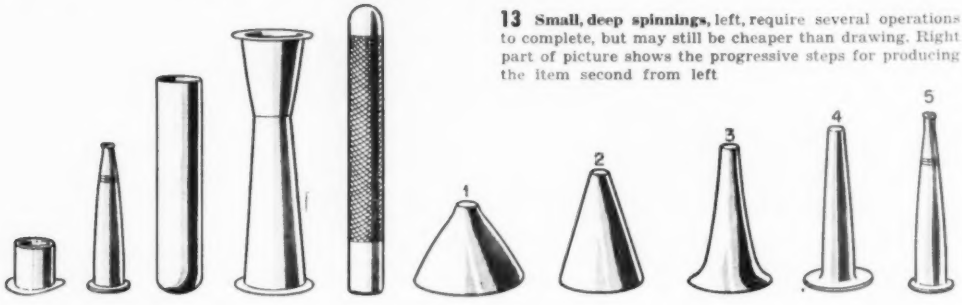
$\frac{h}{d}$	NUMBER OF OPERATIONS		
	Parallel shells	Tapered shells	Domed shells
Up to 1.0	1	1	1
1 to 1.5	1 or 2	1	1
1.5 to 2.5	2 or 3	1 or 2	1 or 2
2.5 to 3.5	3 or 4	2 or 3	2 or 3
3.5 to 4.5	4 or 5	3 or 4	3
5.0 to 6.0	5 or 6	4	4

h = height of shell, d = dia of parallel or domed shells or bottom dia of tapered shells



11 Several operations may be required when the work has a high ratio of height to diameter, or deep reverse contour. Separate chucks are required for each operation. Shallow reverse, at *D*, can be produced on the same chuck used for body spinning

12 **Combined drawing and spinning** will often increase production. Shell at left was produced by drawing; first spinning operation is shown at center; and final spinning and beading at right



13 **Small, deep spinnings,** left, require several operations to complete, but may still be cheaper than drawing. Right part of picture shows the progressive steps for producing the item second from left

depth but made from thinner material. With thick-walled shells the shaping on the breakdown operations usually starts at a diameter equal to that of the finished shell, as indicated at *A*. Thin-walled shells are usually broken down from a larger diameter, as shown at *B*, and this provides better control of the thin metal.

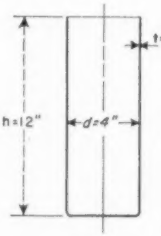
The sketches at *C* and *D* illustrate a few points regarding reverse contours. The shell at *C* has a deep reverse contour which would have to be spun in at least two operations as shown in lower view. The shallow reverse contour at *D* presents no difficulty and could be spun on the same chuck used for the body spinning, and at the same setup, as indicated in lower view.

Semi-circular shells like that at *E* may be spun in one operation, provided the upper portion of the side-wall is not too deep. Beyond certain depth-to-diameter ratios, additional operations are usually necessary, as indicated. Shells with small tubular centers, as shown at *F*, are particularly difficult, and often require several preliminary breakdown operations to bring the center tube down to size.

Blank Size Calculations

Determining the exact blank size required for a spun shell is largely a matter of cut and try, mainly because an increase in area occurs when thickness is reduced during spinning, and this increase varies with the spinner and his technique.

When calculating the blank size for a drawn shell it can be assumed that no appreciable change occurs in the thickness during drawing, and that the area of the blank is approximately equal to the area of the shell. For a spun shell, neither of these assumptions can be made, except in the case of the simplest spinnings. A wall thickness reduction does occur in spinning and, to produce a shell of specified thickness, a thicker blank must be used to start with. Because of this thickness reduction, an increase in area occurs.



No. of Operations

From table, $\frac{h}{d}=3$. Therefore 3 operations would be required. (2 breakdown, 1 final)

Gage Thickness for Blank

Gage required in shell, no. 18 B&S. (0.040 in.) = t
(Add 1 gage for 2 breakdowns and 1 gage for final operation) Use No. 16 B&S ga. (0.064 in.) = t_1

Volume of Shell Metal

Sides = $\pi dht = 3.14 \times 4 \times 12 \times 0.040 = 6.03$ cu. in.

Bottom = $\frac{\pi d^2}{4} t_1 = \frac{3.14 \times 16 \times 0.064}{4} = 0.80$ cu. in.

(total) 6.83 cu. in.

Blank Area

Volume = 6.83, Thickness = .064 ∴ Area $\frac{6.83}{.064} = 106.7$ sq. in.

Blank Diameter

Since $A = \frac{\pi}{4} D^2 \therefore D = \sqrt{\frac{A \times 4}{\pi}} = \sqrt{\frac{106.7 \times 4}{3.14}} = 11.63$ dia. x 0.064

14 **Method of calculating** blank diameter required to produce a spun shell. Theoretical size would be 11⅝x0.064 in. To allow for variables, a 12-in. blank would be used for trial. Blank for drawing would be 14⅝x0.040 in.

Table III ...

Spinning Speeds for Aluminum

Blank dia, inches	Thickness, inches	Lathe speed, rpm
36 to 72	3/16 to 3/8*	250 to 50
24 to 36	0.08 to 3/16	550 to 250
24 to 36	0.04 to 0.07	650 to 450
12 to 24	0.08 to 3/16	450 to 300
12 to 24	0.04 to 0.08	750 to 550
4 to 12	0.04 to 0.08	900 to 600
4 to 12	0.02 to 0.05	1200 to 850
Under 4	0.02 to 0.06	2000 to 1200

* Spin at 400 F

Hence, the blank for a spinning would be greater in thickness but smaller in diameter than the blank for a drawn shell of the same size. The amount of work on the metal necessary to spin the blank to shape may be used as a general guide to the allowance for thickness reduction. Simple spinnings, requiring one operation, will not thin appreciably and need no allowance. For deeper spinnings produced in one or two operations, allow one gage. For those requiring more than two operations, allow one gage for each two breakdown operations, and one gage for the final operation. The general procedure for blank calculations for spinnings is thus based on volume rather than on area, keeping in mind the fact that the bottom of the shell will not change in thickness, and that the sides of the shell will be reduced somewhat.

Speeds and Lubricants

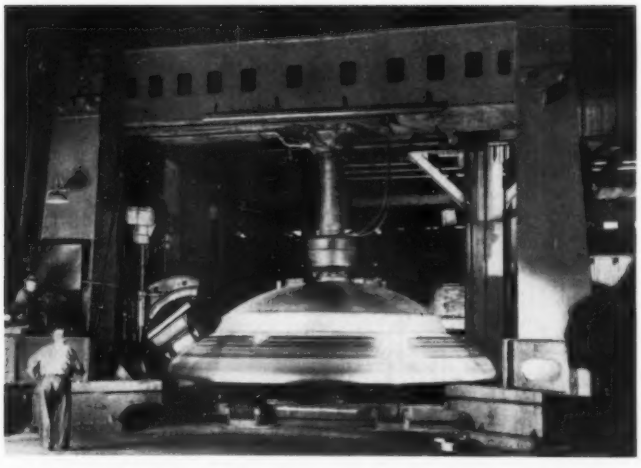
The lathe speed depends on the diameter and thickness of the shell or blank, and the type and temper of the metal being spun. Steel requires fairly slow speeds and high pressures; brass and aluminum can be spun with higher speeds and lower pressures. As the blank diameter and metal thickness increase, the lathe speed should be reduced. The speed to use for any specific job is also affected by the weight of the chuck. Recommended speeds for spinning aluminum are given in Table III, but it is to be noted that this metal should never be spun at a surface speed of more than 5000 fpm.

Lubricants for spinning vary with the metal, and many shops have their own special types. The more common varieties and their applications are given in Table IV.

Table IV .. **Recommended Spinning Lubricants**

MATERIAL	PROCESS	LUBRICANT
ALUMINUM	Small work—light pressures	Beeswax: Tallow & lard oil mixed with Vaseline or white lead
ALUMINUM	Large work—heavy pressures	Laundry soap (alkali free): Neck grease
MAGNESIUM	Shallow spinnings—done cold	Tallow: Laundry soap
MAGNESIUM	Deep spinnings—hot work	Powdered colloidal graphite, grade 620, suspended in carbon tet Must withstand 600 to 700 F
STEEL, BRASS	All	Tallow: Neck grease: Laundry soap

SPINNING EQUIPMENT



15 **Specially built** vertical spinning machine constructed by Lukens Steel for hot spinning heavy steel domes. Hydraulic ram effects first breakdown, and hydraulically operated rollers spin work down to chuck

Spinning equipment may be divided into four main groups: lathes, lathe accessories, tools, and chucks, and each group may be further subdivided into special equipment for specific spinning problems.

Lathes may vary in general design from simple-spindle machines to elaborate ones incorporating many labor-saving features. Special machines, similar in general design to boring mills, are often used for spinning extremely large, heavy work by mechanical means.

Accessories widen the range of work which may be done on these machines. Trim and bead units, screw or hydraulic compounds, air operated tailstocks, compound spinning levers, and annealing burners are a few of the more common accessories which may be supplemented with special equip-

ment for unusual spinning problems.

Screw compounds are used for the mechanical application of tooling when spinning, trimming, or rolling thick or tough metals. A swivel base permits angular setting, and longitudinal and lateral screws permit feeding the tools in both directions. They are sometimes hydraulically operated when the action required lends itself to this method.

Spinning Tools

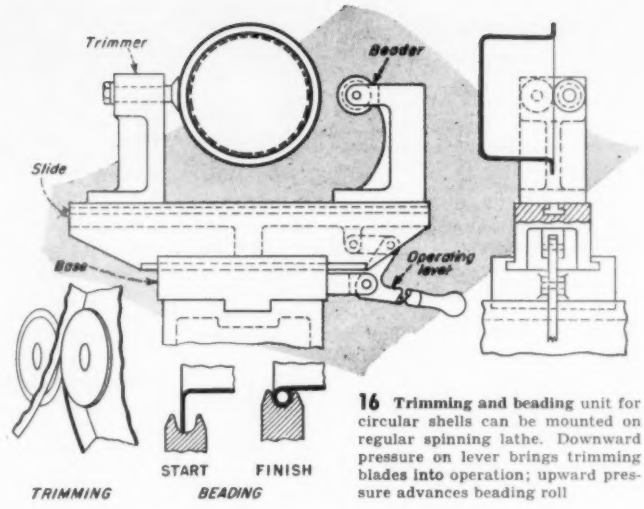
The shape, size, finish and material used for spinning tools, or "sticks" as they are commonly called, plays an important part in the quality of work obtained. Each spinner has his own particular preference in tool shapes and develops his own technique.

The material varies from hard maple or hickory to hardened steel, depending on the metal being spun. The more plastic metals, aluminum, magnesium, copper, and brass, are often broken down with hardwood sticks and finished with steel tools, because too much working with steel tools tends to harden and stretch the metal. For steel and stainless, bronze tools are often used, and an alloy of 90% copper, 8% aluminum, and 2% silicon is recommended. The working faces of spinning tools should be kept smooth and highly polished. Cutting tools are usually made from high speed steel.

A few standardized tools for use on aluminum are shown in Fig. 18. The one at *A* is used for an average size spinning in which there are no small corners into which the metal must be spun. The one at *B* is for larger and thicker spinnings requiring greater pressures. *C* is for small corner work on thin metals. In each case the radiused side of the tool is used for spinning and the flatter side for finishing.

A hardwood breakdown stick is shown at *D*, and for large, thick blanks, stick diameters up to 3 in. in dia may be necessary. *E* illustrates a typical stick handle, having a corded grip and reinforced with a steel sleeve where the tool is assembled.

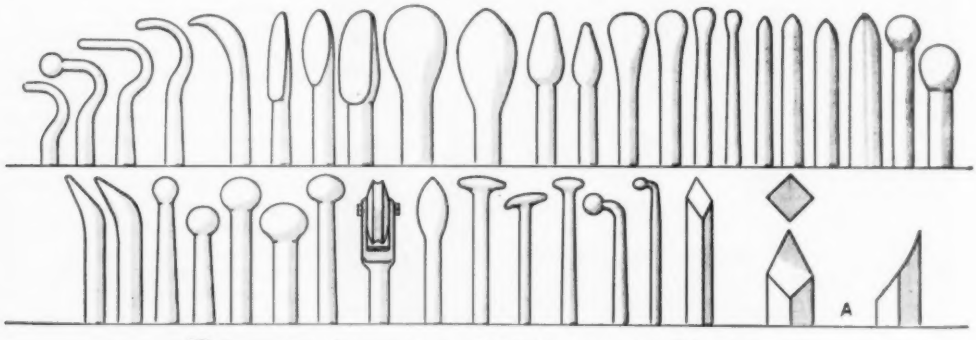
These are hand tools, which are satisfactory on the lighter-gage metals of good spinnability. To apply the higher pressures necessary to spin thick, tough metals, mechanical aids are essential. These may be in the form of a screw or hydraulic compounds, or compound spinning levers in which contact is made on the metal with hardened rolls.



16 Trimming and beading unit for circular shells can be mounted on regular spinning lathe. Downward pressure on lever brings trimming blades into operation; upward pressure advances beading roll

Special Chucks

Spinning chucks are the forms to which the metal is spun, and they may be made from wood or metal, depending on accuracy requirements, lot size, tool cost economics and, quite often, the shell size. Breakdown chucks are usu-



17 Average set of spinning tools will include all the shapes shown above. Most of these are standard, but a few were developed for special jobs. Cutting tools are made of high-speed steel and ground as shown at *A*

ally made from hard maple, beech or birch. They should be built up in cross-grained layers, each layer being glued and dowelled. Wooden chucks should be turned slightly oversize, then soaked well in raw linseed oil and burnished down with a steel tool; re-oiled and re-burnished, then finally turned to size. Maple chucks will hold their shape and size better than beech or birch, which have a tendency to shrink out of round.

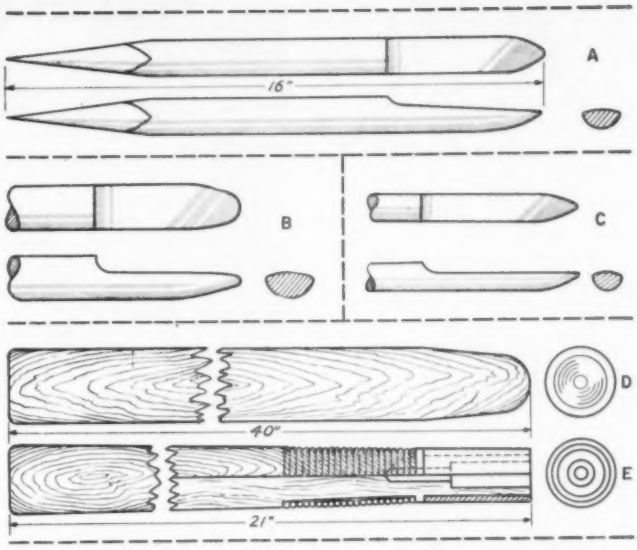
Metal chucks are best for finishing operations, particularly when shell sizes and finish are critical, or when the metal being spun is heavy gage. Small chucks may be made from steel or cast iron. Large chucks are usually made from high-grade cast iron, cored to reduce weight, and balanced to prevent vibration. Stiffening ribs or webs are not recommended because of the difficulty of obtaining true balance. Chucks for parallel-sided shells should be tapered 1/64 in. or more per side to facilitate shell removal. Vents should be provided for the same reason.

Chuck Design

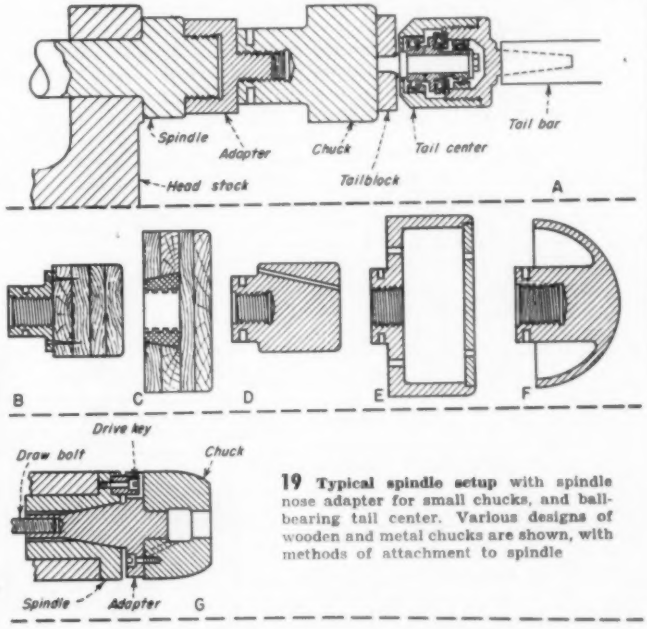
A few general details of chuck design are shown in Fig 19. *A* illustrates the use of a spindle-nose adapter for small chucks. Heavy chucks should be threaded to suit the spindle nose proper to reduce overhang to a minimum. This view also illustrates a typical ball-bearing tail center.

At *B* is a typical built-up wooden chuck having a threaded chuck back for attachment to the machine. *C* illustrates the cast thread method of attaching large wooden chucks. A threaded plug is placed in a cavity at the back of the rough turned chuck and a lead alloy poured in around the thread. When this solidifies a cast thread is formed which is screwed to the spindle. The chuck is then turned to size. It is economical but not particularly recommended. *D* shows a solid metal chuck, and *E* and *F* are two typical cast chucks. Two methods of coring are shown, either of which is satisfactory. The cored surface should be rough machined to obtain reasonably good balance.

G shows an improved chuck connection method similar to that used on milling machines. The lathe is fitted with a hollow spindle having a tapered opening at the chuck end. A tapered adapter is fitted to the chuck and drawn up tight with the draw bolt. This is an excellent system for insuring concentricity, and makes a fine, rigid setup for production work.



18 Standard tools for use on aluminum. Hardwood stick for breakdown is shown at *D*. Handle *E* has steel ferrule to prevent splitting when tool is inserted, and is wound with cord to improve grip



19 Typical spindle setup with spindle nose adapter for small chucks, and ball-bearing tail center. Various designs of wooden and metal chucks are shown, with methods of attachment to spindle

Chuck spinning refers to the spinning of open contours in which there are no re-entrant contours, and the shape can be produced in one or more of the regular spinning operations.

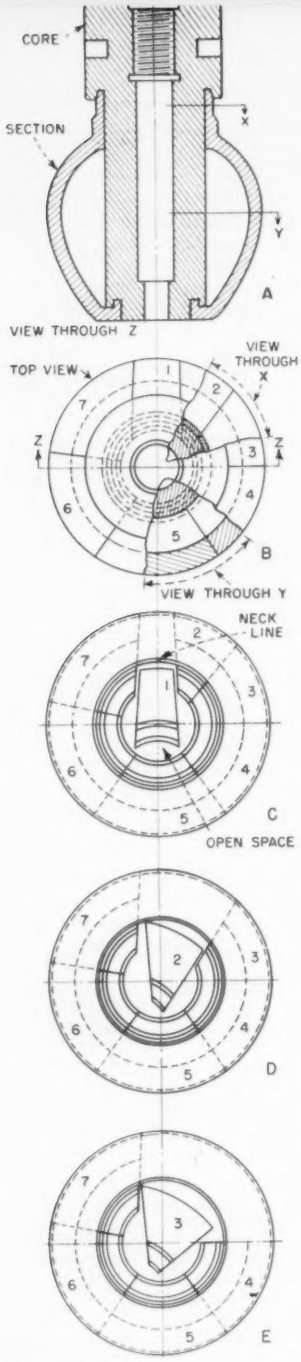
Sectional chuck spinning is used mainly for supplementary work on drawn shells to produce shapes having re-entrant contours in which the neck or opening is smaller than the body of the shell. Sectional chucks must be carefully made and well matched at the section joints to prevent the section marks showing on the finished shell. The best material is steel, but other materials, such as hardwood, masonite or cast iron are often used when the run is small or when weight is a factor. However, the cheaper materials tend to break down at the section joints more quickly than steel and require more frequent servicing.

A typical chuck is illustrated in Fig 20. View *A* shows how the upper and lower ends of the sections are toed-in to the center core. *B* shows how the sections are cut and fitted together.

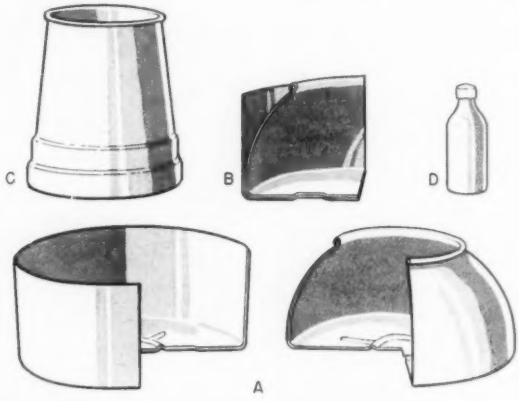
After spinning the metal to shape, the shell and the sections are removed from the core and placed on the bench. The sections are then disassembled in the order of their numerical sequence and reassembled on the core. The next drawn shell is then placed over the assembled chuck and the cycle repeated. No. 1, which is the locking piece, must be assembled last and removed first.

Plan views *C*, *D* and *E* indicate the care with which such chucks must be designed insofar as section size is concerned. The open space is quite small until about three sections have been removed. Section 1 is first moved toward the center, and when it has been moved as far as it will go it is drawn straight out. The outer contour of this section must lie within the neck line of the shell as shown at *C*. Views *D* and *E* show sections 2 and 3 being removed, and as each section is taken out of the shell, the space becomes larger, permitting other sections to be removed.

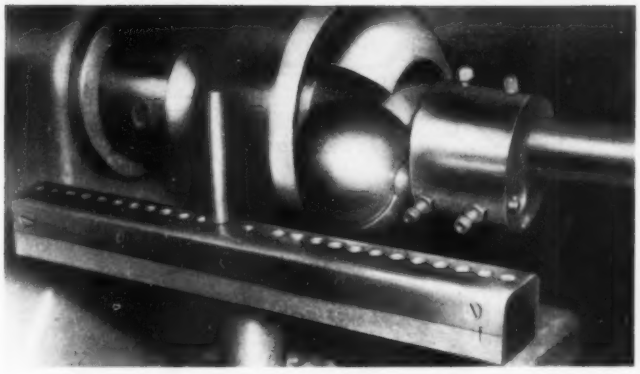
Internal roll spinning is an improved method of spinning re-entrant shapes similar to those shown for sectional chuck spinning. This method is capable of higher production speeds because the shells can be removed from the roll without taking the tool apart. A typical tool of this type is shown in Fig 22. The chuck and tail bar are on the same center and the roll is offset to make contact with the shell wall. A tail bearing fitted to the inner end of the roll shaft



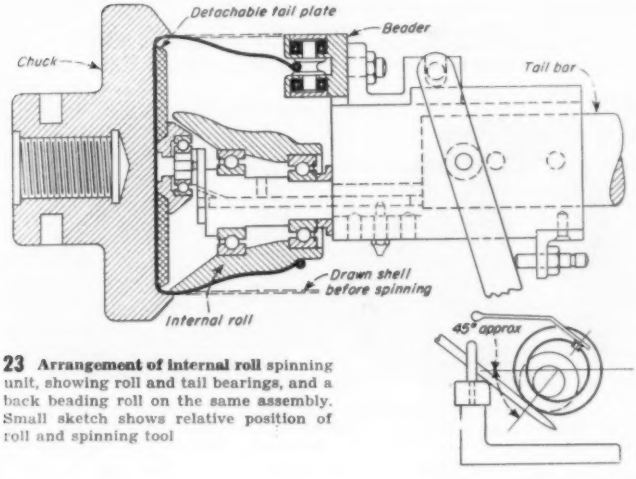
20 **Sectional chucks** are used to advantage when neck opening of work is smaller than body diameter. Sections are numbered consecutively and must be assembled and dissassembled in proper order



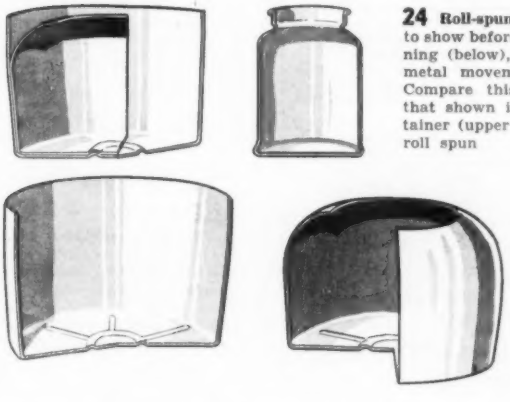
21 **Common forms** produced on sectional chucks. Parts cut away at *A* show shape before and after spinning, and at *B*, the amount of deformation. Bottle at *D* was spun on air to a mandrel the size of the neck. This is practicable only if height limits are not too critical



22 Internal roll spinning avoids expense and delays of sectional chucks. Off-center roll has same shape as inside of work, and metal is spun down to it, as on an ordinary chuck



23 Arrangement of internal roll spinning unit, showing roll and tail bearings, and a back beading roll on the same assembly. Small sketch shows relative position of roll and spinning tool



24 Roll-spun parts cut away to show before and after spinning (below), and amount of metal movement (top left). Compare this contour with that shown in Fig. 21. Container (upper right) was also roll spun

holds a detachable tail plate, and this bearing permits the tail plate to clamp the shell in the revolving chuck and prevent slippage. The spinner works the metal down to the roll, which is set below center, in the same manner as he would on a sectional chuck, being careful to spin on the roll and not above or below it. As soon as the metal makes contact with the roll it will revolve on its center, and with a little experience the spinner acquires the ability to spin to the roll without forming steps on the shell.

All shells having re-entrant contours, however, cannot be spun on rolls. The determining factor is the ratio of the shoulder width to the diameter of the shell opening, the shoulder width being the radial distance from the neck of the shell to the OD. This ratio, which should not be less than 2.6, determines the relative size of the roll and the shell opening. Twice the shoulder width, plus an allowance for the offset spindle diameter, must be less than the diameter of the finished shell opening. It is obvious that the greater the shoulder width, the larger the roll will be, and consequently a larger spindle diameter will be necessary.

Miscellaneous Operations

In addition to regular production on spun hollow ware, spinning lathes may be used for finishing operations on shells which have been partly fabricated on presses. These operations include ironing the wrinkle marks from drawn shells, trimming and beading, rolling grooves or ribs, and knurling decorative lines on shells.

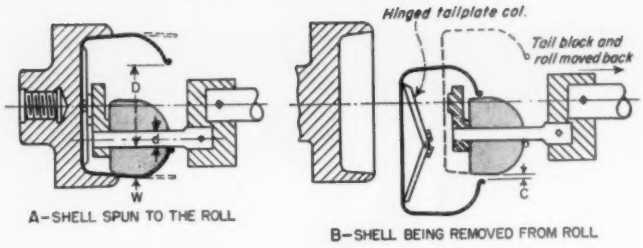
The chuck for an ironing operation should be highly polished and made about 0.005 in. smaller in diameter than the shell. The flat side of the spinning tool is used, and the stroke should be as long as can be made without stopping. To iron the full depth of a shell may require more than one stroke, and in such cases the strokes should be overlapped. As in the last pass on a spinning operation, the pressure should not be too severe, otherwise thinning, stretching and expanding may occur. On straight-sided shells required in substantial quantities, production can be

speeded up considerably by the use of a hardened roll or block which is made to traverse from bottom to top of the shell by means of a leadscrew or a hydraulic feed. Such features as a mechanical feed for the ironing tool, a method of backing out at the completion of the cycle, and reversing rapidly back to the starting point, make this setup quite a short work cycle.

Spinning lathes provide an ideal method of trimming and beading circular shells, and production speeds comparable to those obtained on presses are possible. A trim and bead unit was shown in Fig 16, along with details of the trimming and beading action. Other types of trimmers are also fairly common, using standard tool holders and bits, and circular cutters cutting against the chuck edge.

Rolling

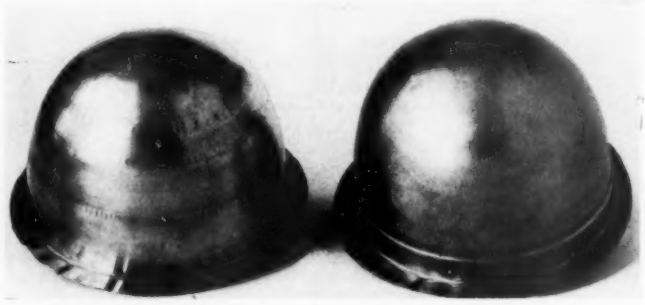
Fig 27 shows a few interesting methods of rolling bulges, grooves and knurls on aluminum shells. The grooves on shells *A* and *B* can be rolled quickly with a tool similar to the one shown at *C*. The decorative marking at *D* can be produced with the tool *E*. A bulge on the bottom of a shell, as shown at *F*, can be quickly formed on tooling shown at *G* and *H*. This tool has a floating sleeve which supports the body of the shell during the operation and is pushed off center as the outer roll forms the bulge over the internal form. Another interesting bulging application is shown at *J*.



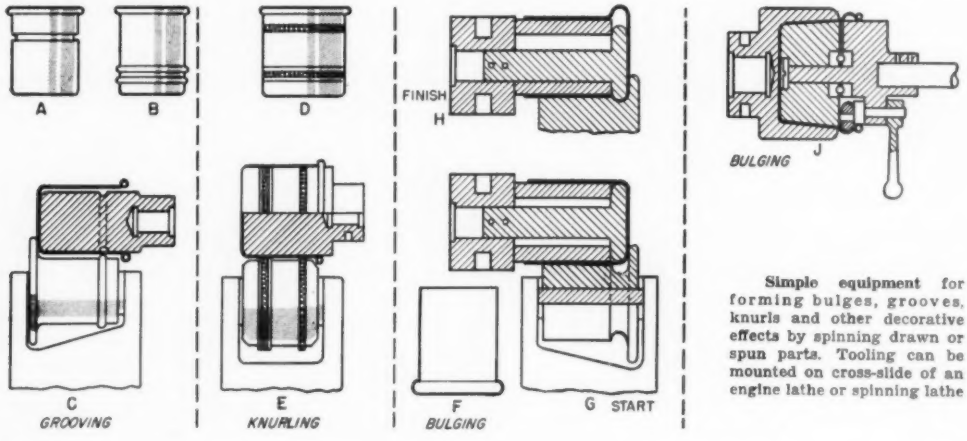
TYPICAL SHELL & ROLL PROPORTIONS

Shoulder width W	Spindle dia. d	Roll dia. (2xW)+d	Clearance C	Shell Opening D min.	Ratio $\frac{D}{W}$
3	2	8	$\frac{1}{8}$	$8\frac{1}{8}$	2.7
$2\frac{1}{2}$	$1\frac{3}{4}$	$6\frac{3}{4}$	$\frac{1}{8}$	$6\frac{7}{8}$	2.7
2	$1\frac{1}{2}$	$5\frac{1}{2}$	$\frac{1}{8}$	$5\frac{5}{8}$	2.8
$1\frac{1}{2}$	$1\frac{1}{8}$	$4\frac{1}{8}$	$\frac{1}{8}$	$4\frac{1}{4}$	2.8
1	$\frac{7}{8}$	$2\frac{7}{8}$	$\frac{1}{8}$	3	3.0
$\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{8}$	$\frac{1}{8}$	$1\frac{3}{4}$	3.5

25 Limiting factor on use of rolls is ratio between roll size and shell opening. Ratio of shell opening to shoulder width must not be less than 2.6 to permit withdrawal of roll



26 Ironing operation may be performed on a spinning lathe to remove draw marks and wrinkles from drawn shells. Shell at left is as received from press; at right, after ironing with spinning tool



Simple equipment for forming bulges, grooves, knurls and other decorative effects by spinning drawn or spun parts. Tooling can be mounted on cross-slide of an engine lathe or spinning lathe

We Mobilize for Freedom

FIRST OF A SPECIAL SERIES

The Defense Production Problem

To win out in the struggle for freedom into which the Russian Communists have plunged us we must do at least four things. We must:

1. Speedily carry through a program of defense production which, at its peak, is scheduled to take about one-fifth of our national output.

2. Pay for this program as we go, by methods that will enable us to maintain the effort for an indefinite period – as long as may be necessary to insure peace and security.

3. Manage intelligently and endure intelligently a set of direct government controls which, in certain critical departments, will put our national economy for a time in a hateful straight jacket.

4. See that these emergency controls are not fastened upon us permanently thereby presenting to our Soviet antagonists a major victory for collectivism on our home front.

This is the first of a series of editorials designed to present in the simplest terms these key aspects of our struggle to preserve our free institutions.

A Staggering Task

The magnitude of the defense production job staggers the imagination. Over the next year it calls for a larger volume of goods and services than the 20 million people of the states of New York and New Jersey will use for all purposes. The (London) TIMES has observed that, taken alone, the increase of defense expenditures which has been budgeted for the federal government's coming fiscal year (about $30 billion) "is in itself not far short of the total national income of the United Kingdom."

Yet so powerful is the production machine created by free American enterprise that, at the scheduled peak, the defense program will take only about one-fifth of our total national output. The exact form and dimensions of the program will, of course, be hammered out on the anvil of public and congressional debate. But the President's recent estimate of an annual rate of expenditure of $45-55 billion for defense by the end of this year may well turn out to be somewhere near right.

To meet even these vast requirements of defense production we are in better shape technically than we were when we started to prepare for World War II. Our industrial plant and equipment is greatly improved. Over $65 billion has been invested in it since V-J Day. Our working force is about eight million larger than it was ten years ago and much better trained.

The difficulty, and it is a very serious economic difficulty, is that we must fit the defense program into a productive machine that has been almost fully extended to meet the needs of a booming civilian demand. The present plan is to step up defense production during 1951 from about 7% to about 18% of our total national output. Because there is relatively little slack in our economy, this means that civilian production at the outset must

be cut back as defense production is stepped up.

The cut-back of civilian goods must be especially severe in the case of products made of metal. This is particularly true of goods that use scarce strategic metals such as aluminum and copper. Of our total defense production program, about half will go for "military hardware" – airplanes, guns, munitions, tanks and the machinery to make them. By the end of 1951 defense requirements are scheduled to absorb most of the metalworking production not required for essential construction and for the spare parts necessary to keep existing equipment running. For a time at least, there will be a sharp cut in the supply of new metal products available to civilian consumers. The defense squeeze on both materials and manpower will also cut sharply into housing and other civilian construction.

For the Short Run — Controls

In the short run there is no answer to the problem of meeting defense production schedules except controls. Sharp reduction of non-defense expenditures by government is essential and would help greatly. But the basic fact is that we cannot increase our total production fast enough to meet immediately both civilian and defense requirements.

Controls are needed, therefore, to switch resources from civilian to defense production, and at the same time prevent the combined demand for critical products from sending prices right through the roof. In the case of many scarce strategic metals such as nickel, copper and cobalt, the task of increasing output is especially difficult because our limited supplies are tucked away deep in the earth in many quarters of the globe.

For the longer pull – and that is what we must face – there is another answer to our defense production problem that is infinitely better than controls. And this time, in contrast to World War II, it is all-important that we get the right answer to our defense production problem for the longer pull and that we get it right now. In World War II we geared our economy to meet the requirements of a relatively short and decisive conflict. Now our leaders, however they may differ as to methods, are well agreed that, at best, "the conditions under which we labor may persist for ten, fifteen or twenty years." That is General Bradley's phrase.

For the Long Pull — More and Better Production

For this longer pull, the constructive answer to our problem of defense production is clearly more and more efficient production all along the line. It is true that overall we now have the most efficient industrial establishment in the world. But, even so, much of it is far short of attainable efficiency. Some plants using up-to-date equipment and methods are as much as six times more efficient than others in the same industry that are lagging in modernization.

Our Director of Mobilization, Charles E. Wilson, has clearly in mind this problem of increasing our industrial efficiency. The first step in his job, as he conceives it, is to get out an adequate supply of weapons to equip the army, navy, and air forces already mobilized or in process of organization by us and our allies. The second step is to make sure of our capacity to produce both "military hardware" to meet any increased requirements and the maximum possible volume of goods for civilian use.

In concentrating on more and more efficient production, Mr. Wilson is squarely on the beam. We can attain his objective – by sustained effort on the part of each one of us backed by up-to-date industrial methods and equipment.

If we do that, we can maintain indefinitely an adequate defense effort and at the same time enjoy a standard of living higher than any other in the world.

Additional production and more efficient production are our surest safeguards against our two most menacing enemies on the home front – the deadly inflation that can destroy our free economy, and the strangling government controls that can destroy our political freedom.

McGraw-Hill Publishing Company, Inc.

ROUND TABLE

Good for Evil

"Smedley is trying to get a job as foreman at Squeegee Press, Al, and they wrote me for a recommendation. Boy, when I get through, he'll wish he hadn't given my name!"

"Smedley is the boy you had the big argument with when he quit, isn't he, Ed? I'll bet their employment department picked it up from his application and he doesn't know they wrote you."

"All the better. He'll get quite a shock when they turn him down as a bullheaded moron! It may teach him to be careful of what he says."

"How tall are you, Ed?"

"Why, what's that got to do with it?"

"Well, you're acting like a 5-year-old kid—or like one of those old-fashioned kings who could do no wrong."

"Look, Al, he called me a hot-headed jackass that day. Would you let a man get away with that?"

"If it was justified. You were pretty hot-headed that day—or you wouldn't have let the argument get your goat. Seems to me I've read that a man becomes a jackass when he gets mad—so there you are."

"Now, wait a minute, Al! Are you calling me the same thing he did?"

"Don't be so thin-skinned, Ed. I was just trying to point out that you were pretty close to what he called you that day—you get hot when you should have stayed cool!"

"Well, maybe I did, but it made me mad when he walked out right in the middle of a job."

"But why did he walk out? He's a good man—one of your best; you told me so yourself long ago. He must have had some reason."

"He didn't give me any—just said he was leaving right then. He didn't show any consideration for me or the company. Why should I show any for him now?"

"Did you give him a chance to tell why? As I heard it, you got sore because he was—and you both blew your tops. Maybe the machine or the toolbit was kicking up, or maybe he lost at bowling the night before."

"It's his place to be quiet about it, in either case. He should know by now I'd do what I could to help."

"Well, what's done is done. Why don't you be big enough to take the first step towards straightening things out? Tell the truth: He's a good man, and if blowing his top is bad for a foreman, you're just as guilty as he is."

"What are you, Al, a missionary? Want me to return good for evil, eh? Nope—if he couldn't be cool-headed about his own troubles, he can't be about the troubles of other people. And that's any boss's job."

"What I said before still goes. You're just trying to make him take the first step. Turn the other cheek, Ed; he'll be a better friend than an enemy."

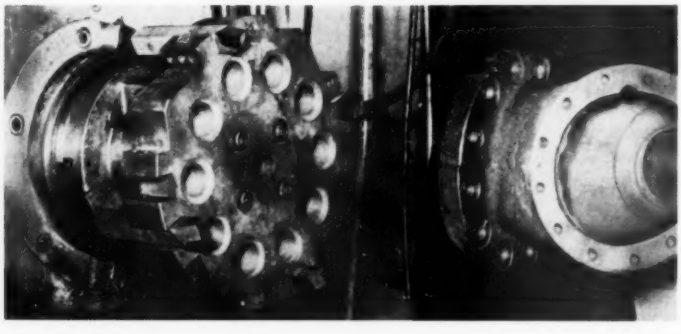
"He had a lot of cheek then and now—and come to think of it, so have you."

***WAS SMEDLEY'S FIT** of temper a condemnation of his abilities as a handler of men? Who is right, Ed or Al? Your opinions or ideas will interest others. Discussions of earlier topics appear on later pages.*

TORQUE-TEST RECORDS GUIDE TAP DESIGN

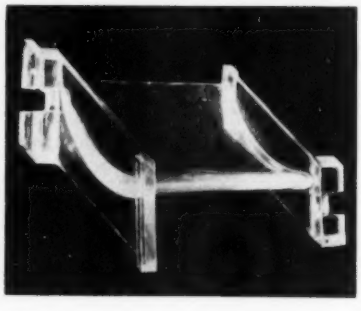
Short shaft section with resistance-wire strain gages bonded in place indicates torque requirements during sample tapping jobs at controlled setup. Graphs recorded by Baldwin SR-4 Torquemeter during two-year testing program indicate effects of rake, relief, chamber, and other angles on cutting power of taps. *Greenfield Tap & Die Corp.*

TALENTED TOOLING



PLASTIC BLADE PATTERNS STORE INDEFINITELY

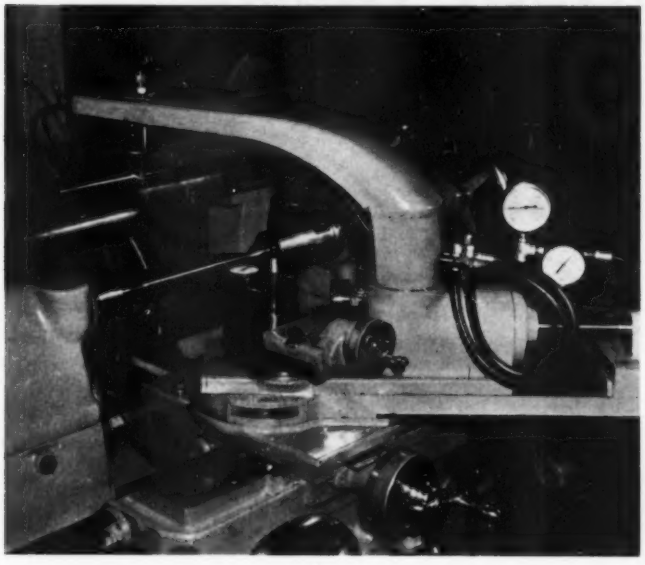
Jet-engine guide vanes for nozzles are cast in lost-wax process, but wax has been replaced by polystyrene. Plastic, unlike wax, won't melt in storage and can be kept on hand for months. Patterns are injection-molded cheaply, then attached to wax trees when mold is formed. *A. V. Roe (Canada)*



CARBIDE FLYCUTTER BITS EASE POWER LOAD

Turbine parts, formerly milled in two passes with a 14-blade conventional cutter, are now faced off in a mill with one pass and no motor overload. Standard carbide bits are set in 0.050-in. steps radially and $\frac{1}{8}$-in. steps axially to remove $\frac{1}{2}$ in. of metal. *Carboloy Co.*

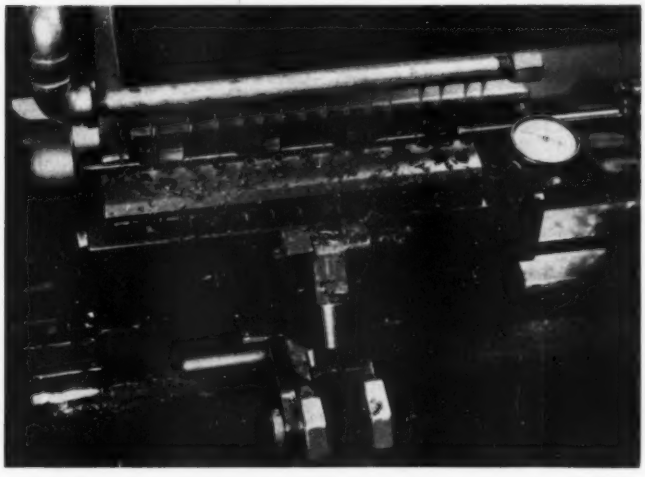
DUMMY CONTOURING SETUP CHECKS LATHE TRACER CONTROLS

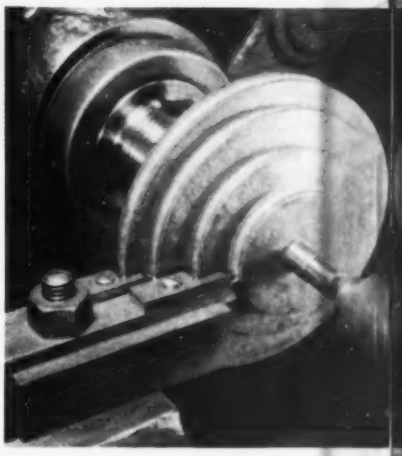


Air-gage tracer unit installed on contour lathe follows pattern and indicates duplicate pattern chucked in spindle with dial indicator mounted in place of lathe tool in post. Six-hour run is examined intermittently for zero-reading of indicator. Tolerance for factory test is 0.0001 in., outside of which the indicator must not read at any time. *Monarch Machine Tool Co.*

TOOL CARRIER BOOSTS SHAFT OUTPUT 500%

Grooving carrier block with up to 26 bits makes one pass into ¼-in. stock, can produce 400 shafts per hour. Coolant flows from pierced pipe overhanging work. Cut depth is gaged by dial indicator; precision is increased by solid backrest behind work. Machine is high-speed Hardinge second-operation lathe. Tool life is 2000 parts per regrind. Tolerance is ±0.001 in. *California Metal Products Co.*

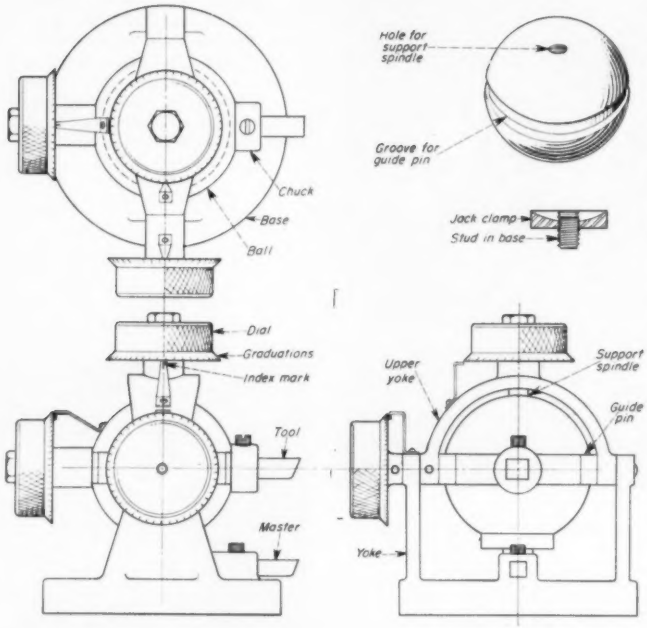




SINGLE TOOL GROOVES PLASTIC PULLEYS

Replacing metal, fabric-base plastic can be groove-turned in one pass with a four-edge toolbit equipped with double chipbreakers. Pulleys for spindle and motor of precision drill are cut in same way, eliminating five machining operations and cutting pulley cost by two thirds. Spindle holes are molded, then reamed; setscrew holes are drilled and tapped in separate operations. *Synthane Corp.*

Practical Ideas



Tool-Grinding Fixture Has Three Angle Scales

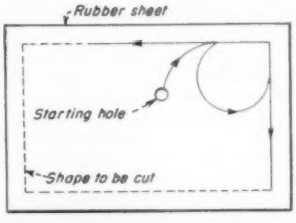
TOOLBIT ANGLES may be ground directly from a master bit form, or may be set on the three dial scales of this fixture for accurate reproduction or original grinding of lathe toolbits. The scales gage rotation of the bit in three directions, allowing clearance, rake, and any special angles to be accurately reproduced on the bit.

The round base of the fixture is cast with a yoke that supports a second, top yoke; which, in turn, supports the ball and bit-chuck spindle. The hole into the ball in which the spindle for the top scale is mounted must be accurately centered, and the circumferential groove around the outside of the ball must be located exactly in a plane at 90° from the axis of the hole, but these are the only critical machining jobs on the ball. To prevent backlash and rocking, the two pins that ride in the slot must be accurately machined to fit the slot without excessive clearance.

A toolbit is clamped in the round chuck and held with a setscrew when a setup is made. If the tool is to be rotated around its own axis, this angle can be set at the dial and handwheel that attach to the spindle that supports the chuck. To set clearance angles, the other handwheel is turned, which results in a shift of the top yoke along the scale that is mounted vertically beside it. The third direction of angular setting is controlled by the top dial.

Clamping the ball, once the angles are set, is done with a jack mounted in the base of the fixture. A sphere-turned pad is raised by the screw jack to bear against the ball. Because the jack may be raised to clamp the ball when as many as three angles are set, it is necessary to have all spindles and bearings matched carefully so the fixture will not spring in any direction when the jack is tightened.

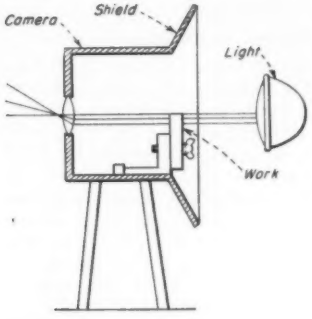
On the base a second clamp is located to take a master toolbit when copying is to be done. For this kind of work, a small angle plate should be clamped parallel to the face of the grinding wheel, on the table, so the master can bear against it. The master or the new bit can be adjusted so the master touches the plate when the bit touches the face of the wheel. The face of the angle plate should be directly below the face of the grinding wheel, which would allow moving the whole fixture by hand, from side to side, to bring all cutting edges of the bit against the wheel. *John Dernoga, Rochester, N. Y.*



Ground-Off Bandsaw Blade Cuts Rubber Sheets

TO CUT accurate shapes in thick rubber sheet, I use an old bandsaw blade in a machine that will run fairly slow. The blade is ground with a toolpost grinder to eliminate the teeth and to form a knife edge while it is moving slowly on the sawing machine.

To cut an inside shape, a broken blade is inserted in a starting hole in the sheet, then rewelded and ground on the machine. Corners are cut by running directly into them from the two sides, one after the other. The blade is kept wet while cutting. *F. Ablitt, Sheffield, England.*

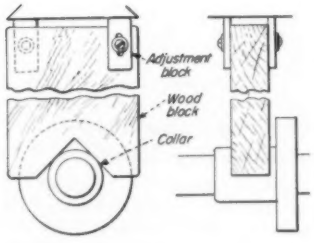


Shop-Built Projector Compares Drawings, Work

A CONVENIENT METHOD of checking the outlines of gages, threads, and other accurate machined profiles is with a No. 2 box camera acting as an optical projector. The camera is fitted to a stand and located in line with a light source and a screen.

A shield was mounted around the open end of the camera to prevent light from hitting the screen directly. Test objects are mounted on an angle plate inside the box close to the open end. These must be clamped to line up accurately so a shadow will be thrown on the lens.

After the focusing distance has been worked out, the screen can be fitted with a pair of scales, one horizontal, and one vertical, for accurate measurement of the profile of the work. *R. G. Vare, Holmsley, England.*

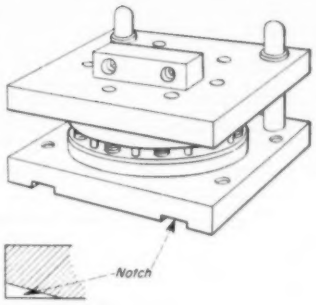


Milling-Arbor Supports Stop Cutter Wobble

DUE TO FIXTURE or cutter design, work sometimes must be located out toward the end of the overarm on a milling-machine table. This means poor support for the cutter and heavy loads for the arbor. Some such cases can be improved with a readily made overarm support.

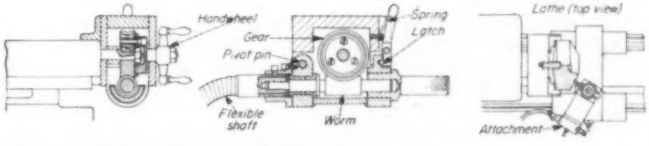
Pieces of hard wood can be cut to a 45° V-groove at the bottom to center over the arbor and can be fitted with clamps at the top to match the shape of the overarm. This one has adjustable steel blocks, which allow a certain amount of variation of the diameter of arbor for different jobs.

The support is located fairly close to the cutter, preventing chatter and cutting down on wobble. The adjustable clamps also take up wear as the block gets older; however, I have used several hard-maple blocks for two years, eight hours a day, and they show hardly any wear. Compression should not be too great. *R. L. Fairchild, Dayton, O.*



Die-Block Notches Make Handling Easier

HEAVY DIES can be handled much easier, both on and off the press, if a couple of notches are flame-cut into the bottom face of the lower plate. This allows pry bars to be set in for easy leverage, which speeds press setups and teardowns. *Frank M. Butrick, Jr., Alma, Mich.*



Flexible-Shaft Attachment Operates Cross-Slide Feedscrew

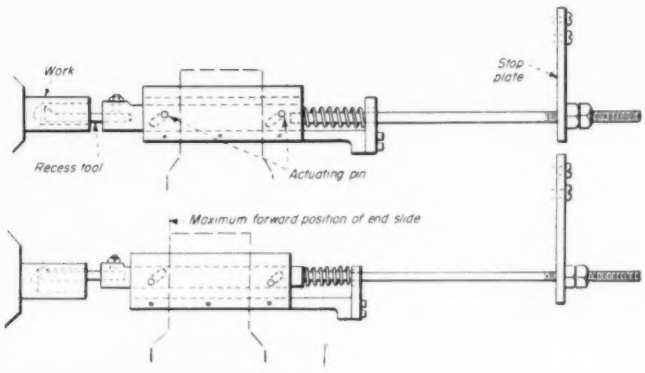
HEAVY TURNING at odd angles means tough hand work; and when we started to turn some high-carbon gyroscope castings, we found that we had to do them on an engine lathe. The angles varied between castings, so each new one meant a new angle setup for the cross-slide. By powering the slide feedscrew, we eliminated considerable fatigue on the part of the operator.

The micrometer dial and crank handle were removed from the slide, and a worm wheel was substituted. An extension on the worm wheel was added to allow rebolting the feedscrew crank into position so adjustments could still be made, despite the added mechanism. Side plates held the worm in position below the wheel, and these were fastened to a frame so the whole mechanism was covered.

Power was provided by a 1-hp flexible-shaft unit on the floor adjacent to the machine. The unit had a slow-speed drive and a 3-step cone pulley to provide a choice of slow speeds.

To disengage the worm drive and shift the slide with the crank, it was only necessary to trip the latch that held the worm and wheel in engagement. With the latch released, the worm dropped as the assembly swiveled on a pin at the front of the assembly.

Worm-drive torque was resisted by a piece of angle iron bolted to the frame to rest on the top of the slide. The unit could be removed from the lathe in minutes. *Tom Brown, Middlesex, England.*



Deep-Hole Recesser Works on Screw Machine

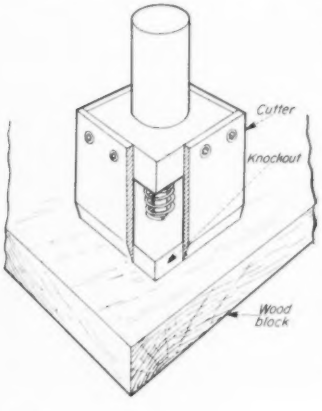
FOR FOUR- AND SIX-SPINDLE automatics we have developed a recessing attachment that operates automatically to cut the inside walls of products or to chamfer the ID before cutoff.

The body is a block of cold-rolled steel, slotted out to receive a slide that is rectangular in section, and closed off by a plate that supports a bracket at its tailstock end. The front end of the slide carries a suitable long toolbit that does the required work, while the rear end is fitted with a long rod that works through a stop plate bolted to the machine frame.

An end slide on the machine carries the tool. As this slide goes forward, stopnuts on the threaded rod hold the tool slide back. This action forces the slide upward because of pins through the block which go through slanted slots in the slide. The motion raises the tool, and makes it cut into the work.

As end tension is removed (when the end slide returns in the machine cycle), the compression spring between the slide and bracket forces the slide back to its original position where it will clear the wall of the work.

Toolbits for different jobs are controlled by the length and alignment of the slots in the slide. *R. G. Planck, Nutley, N. J.*



Cookie Cutter Clips Sheepskin Pads

TWO-INCH-SQUARE PADS had to be cut from sheepskin recently. These had formerly been cut with a razor blade, one at a time; but the new order was larger and required better methods.

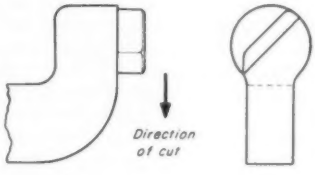
The "cookie cutter" illustrated was made and installed on a small hydraulic press. Cost was low, and setup time was low. We have had good results with it, including long life between grinds, and adaptability for gasket materials as well as sheepskin. *Donald Amison, Providence, R. I.*

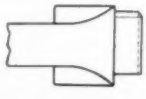
3 Shop Ideas Speed Small Jobs

WHEN A PIECE of steel is too hard for ordinary HSS drills, you can make a small drill inexpensively by taking drill rod and grinding an old-fashioned flat point on it. Then heat the drill to cherry red, dip in cyanide, hold at cherry-red heat about a minute, and finally quench in mercury. Run the drill with steady pressure, slow speed, and plenty of cutting oil, and clear out chips frequently.

When tailstock centers are too short to eject easily from a lathe tailstock, use a small bearing ball behind it. The ball will make up for the shortness of the drill, and doesn't have to be fished out because it will roll out of its own accord on tapered tailstock bores.

When taper-turning is necessary, and the angle is fairly large, replace the ordinary centers with inverted — or female — centers. Then mount the work with old bearing balls between the machine centers and the centers in the work. Lubricate well, and make sure the balls set well in each center bore. *R. C. Hoard, El Paso, Texas.*





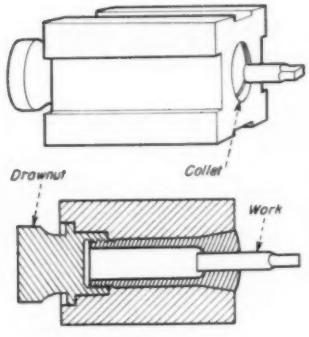
Shearing Shaper Tool Produces High Finish

SMOOTH FINISHING CUTS, especially on steel workpieces, are made with the illustrated tool which fits in a conventional shaper or planer clapper box. Clearance angle is 5°, and shearing angle is 45°.

Because the tool is offset toward the rear, no chatter develops during the cutting, or shearing, as the tool finishes. This arrangement is

simpler and better than spring or goose-neck tools.

A welded or brazed carbide tip can be installed in place of the steel bit. This produces a finish almost equal to a grinding job. *Martin H. Ball, Watervliet, N. Y.*



Bench Collet Block Chucks Round Stock

TOOLROOM WORK is made easier on some jobs with this chucking block that grips round stock. It can be a bench setup fixture, or can be mounted on the magnetic table of a grinder for light work.

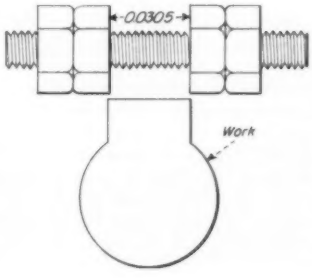
The hardened and ground base is drilled for a lathe-type drawbar and split collet, operating just like a lathe does. In fact, the block can be made for a standard series of collets.

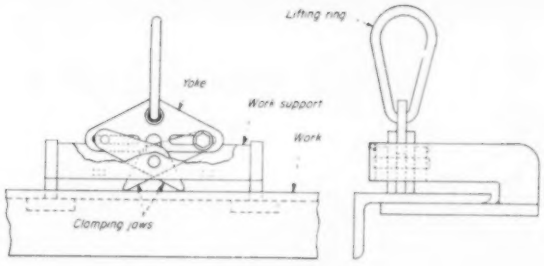
Round work can be machined square, right angles can be ground, and clean-up work can be done accurately with this device making the stock setup. The only addition to the drilled, reamed, countersunk, and tapered hole is a cross hole to take a pin that keys in the collet to prevent twisting of the work when chucked. *D. Zuerl, Fulton, Mo.*

Screw Gage Adjusts To Check Work Widths

WHEN WE HAD to inspect a number of keyslot-shaped blanks for width of extension, we discovered a fast way to make a simple, adjustable gage. The blanks were all the same shape and size except that many of the square extensions were oversize. These had to be picked out and reworked.

We took a headless screw, mounted locknuts on each end, and set the nuts to the largest allowable dimension with an inside micrometer. Then we inserted the blanks, one after the other, in between the nuts. Those that entered were passed; the others were sent back to the shop. The gage is a type that can be utilized by unskilled labor because there is nothing to damage, and gage inspection and adjustment is easy. *Federico Strasser, Santiago de Chile.*



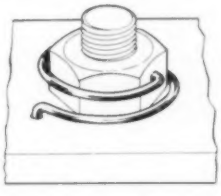


Automatic Lock Makes Lifting Hook Safe

TO LOAD sections of structural steel into a bending die, we made this lifting hook that permits tilting the load in any direction.

The hook was made up mainly of pieces cut to shape and welded and pinned together. The crane hook is slipped into a bent lifting ring that goes through a yoke. Two horizontal slots in the plate carry and locate pins that support the two gripping jaws of the hook. The heavy notched piece that lifts the work is fitted with a pin that the two jaws pivot around.

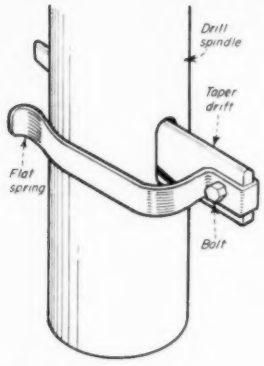
When work is loaded into the support piece and the ring is pulled, the clamp pieces are pulled by the web plate, pivot around the pin in the main piece of the rig, and clamp down on top of the work. For greater gripping power, the jaws can be serrated. *H. G. Frommer, Milwaukee, Wis.*



Spring-Held Nut Locks Quickly

A LOCKNUT that will assemble or disassemble rapidly; yet will hold securely, can be made by adding a small spring to an assembly joint and drilling two small holes.

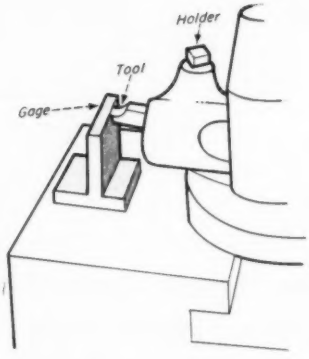
The spring is cut from a compression spring, and is bent so the two ends will fit into the two small holes to exert tension on the nut to keep it tight. The nut can be released only by slipping a screwdriver between the nut and spring and prying the spring off. When assembling, it is easy to tighten the nut, then slip the spring into position. *John Dernoga, Rochester, N. Y.*



Drift Spring Stops Drill Damage

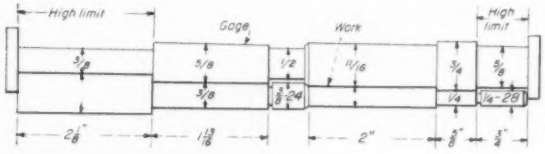
HERE IS a quick and easy way to insure that a taper drift will stay in a knockout hole in a spindle when a drill is being removed. This frees the left hand to hold the drill and to prevent its falling and damaging itself.

A piece of spring steel, cut to strap shape, can be bolted to the drift or can be soldered in position. The drift can be then pushed into the knockout hole and held loosely by the spring until it can be taken out by the operator. *Tom Brown, Middlesex, England*



Bit-Height Gage Helps Reclamping

REPEATED GRINDING of the lathe toolbit can often change the level of the cutting edge to quite an extent, depending on just how the toolbit is reground. We avoid a lot of minor readjustments because of this fact by making a little height gage when the setup is first made. The gage can be replaced on the cross-slide during the run so it can be referred to after a regrind. The tool is simply reclamped, and then the gage is located next to the edge of the tool so a comparison can be made. *Robert Laimbock, Innsbruck, Austria*



Visual Gage Checks Shafts at Machine

SHAFT GAGES for quick comparisons at the lathe can be machined on the lathe when the setup is made. The gage checks lengths of shaft sections, and has the advantage of 360° of wear surface.

All dimensions are turned to the nominal dimensions of the job, except the end shoulders, which are faced to the maximum limits to allow the part to enter if it is within allowances.

Because the gage matches the dimensions exactly, checking is done by holding gage and work together, then holding them up to a light for a visual inspection. This avoids the use of gage blocks or micrometers at the machine, leaving final inspection to an assembly stage where expensive gages and skilled inspectors must be utilized anyhow. *Clarence B. Winch, Tonawanda, N. Y.*

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for the best PRACTICAL IDEA

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JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

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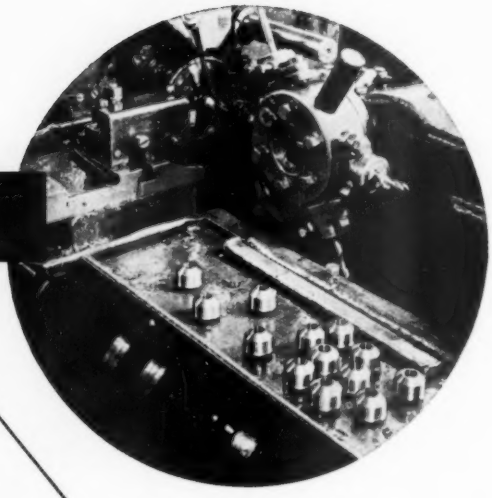

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American Machinist REFERENCE BOOK SHEET

Carbide Department for a Job Shop...I

BY ARTHUR TILSTON, De Laval Steam Turbine Co.

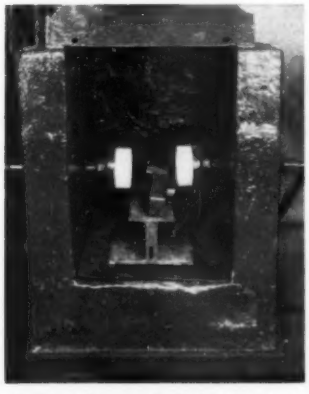
THESE recommendations for handling carbides are based on our experience in establishing a carbide tooling department at De Laval, where the work is essentially job shop in character. At present 78% of the entire plant is using carbide tools for all applications.

The utmost care should be taken in the selection and training of the working force for the carbide tooling department. It will include a supervisor, fabricators, applicators, and grinders.

Supervisor should be a man familiar with all types and operations of metal removal.

Fabricators deal with the milling of the carbide shank, brazing of the carbide tip to the shank and the more complex grinding of the multi-point tools. They should be picked men from among the machine-tool operators.

Applicators introduce the new tooling and its use to the men in the shop and assist the operators with any machining problems that arise. They must be able to persuade the operators to try speeds and feeds they would not ordinarily think of using.



Brazing furnace built in the shop contains Selas burners and will produce temperature of 1800 F

Carbide fabricator grinds a carbide-tipped counterbore on a tool and cutter grinder

Grinders grind the new single-point cutting tools and resharpen such tools after use. In small shops these jobs can be performed by the fabricator.

EQUIPMENT

The following equipment is required for the efficient operation of a carbide tooling department:

A double-spindle 10-in. wet grinder will serve for all rough grinding. We mount a cup wheel on one spindle and when the face is completely used up transfer it to the other spindle and grind on the periphery. In this way the maximum amount of life is obtained from each wheel. We find that a faster and better reconditioning is obtained when the tool is first ground on the periphery of one wheel and then given the final grinding on the face of the cup wheel.

A twin-spindle machine is used for finish lapping. Diamond wheels for this operation will more than pay for themselves in the savings of carbide and longer tool life. If properly applied, and if the faces are kept flat, they will give satisfactory life. Not more than 0.005 to 0.010 in. should ever be removed with these wheels. They should only be applied to produce the primary clearance or relief angle on the cutting edge. This should not exceed 0.015 in. in width thickness.

Brazing of tips to shanks can be done with an oxy-acetylene torch. To braze larger tools, a small air-gas furnace can be constructed with Selas burners. Such a furnace is fast and inexpensive and insures a more uniform heat, producing a better braze.

For shank milling, a machine with a swivel head will permit all clearances and the tip recess to be milled in one machine.

Grinding of multi-point tools is done on a No. 2 tool and cutter grinder. Intricate form tools and other surface grinding work can also be done on this machine.

TRAINING

To assist in training the carbide working force, excellent literature and training films are available from the carbide manufacturers. Lectures for the operators can also be arranged through these companies. Carboloy conducts a two-week course in their plant school in Detroit. It is given without charge.

HELLER

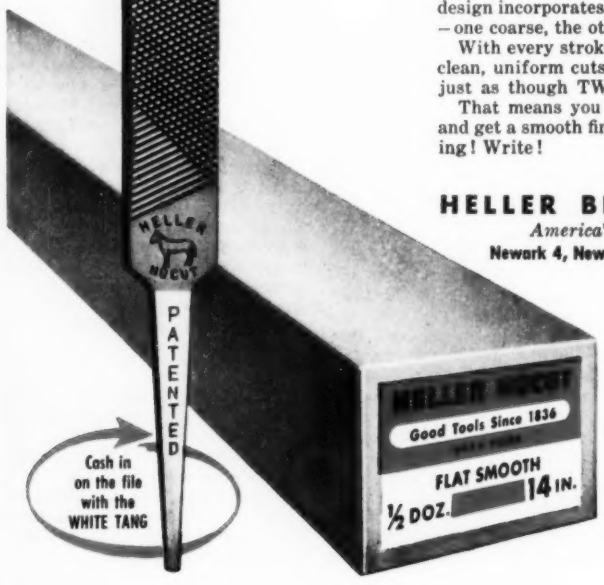
NUCUT WAVY TEETH FILE

GOOD TOOLS SINCE 1936

. . . it's different

. . . it's patented

. . . it's the only file that gives double-duty filing action



It's the patented Heller Nucut "Wavy Teeth" feature that makes the difference. This cut-and-smooth two-in-one filing design incorporates two sets of *scientifically* positioned teeth – one coarse, the other fine.

With every stroke of a Nucut, the coarse teeth take deep, clean, uniform cuts. The fine teeth leave a smooth finish – just as though TWO files were working instead of ONE.

That means you can remove more metal faster, easier, and get a smooth finish without clogging, skidding or scraping! Write!

HELLER BROTHERS COMPANY

America's Oldest File Manufacturer

Newark 4, New Jersey — Newcomerstown, Ohio

Ask also about our COMPLETE LINE of Swiss Pattern, Vixen Milled Curved-Tooth and Rotary Files, Rasps, Carpenters', Machinists', Tinners', Upholsterers', Bricklayers', Tilesetters', Blacksmiths' and Farriers' Hammers. Also Bricklayers' and Plasterers' Trowels, Craftsmaster Scrapers, Chisels, Punches, Masterenches and other quality tools.

Carbide Department for a Job Shop...II

CONDITION OF EQUIPMENT

Before carbide can be successfully applied to any machine tool, it should be carefully checked. The spindle drive should be inspected. If V-belts are employed they should be tight and in good condition. Spindle bearings should be checked for end play. All gibs should be tightened to insure rigidity. If rockers are used on the toolpost or toolholders they should be discarded. In their place steel shims of variable thickness should be employed to position the tool on center. The tool shank should be at right angles to the diameter being turned or faced.

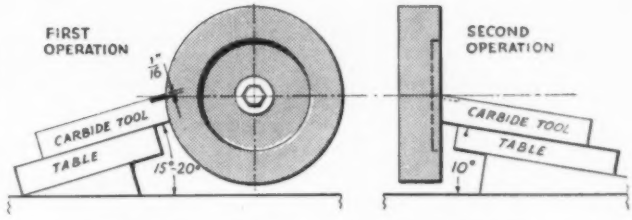
APPLICATION

The small shop can get by with only two grades of carbide. They are Carboloy 883 or Kennametal K6 for cast iron, brass, bronze, and plastic; and Carboloy 78B or Kennametal K2S for steel. These will be satisfactory for most jobs.

Surface speeds and feeds for these applications are:

	Sfpm	Feed
Cast iron	150-300	.005-.018
Bronze	300-1000	.005-.025
Steel	150-450	.005-.018

The following points should be kept in mind in applying carbide:



Tool reconditioning with two cup wheels. Clearance is ground first on the periphery of one wheel and then relief is ground on the face of the other cup wheel

1. Do not overtax the horsepower of the machine. A tool stalled in a cut with the feed on will break.
2. Keep spindle bearing and gibs snug. This will hold chatter to a minimum. Chatter and carbide tools do not mix.
3. Keep workholding devices as rugged as possible. This will help to eliminate chatter and produce longer tool life.
4. Keep tool shanks square with diameter being cut. In some applications 0.015 in. above or below center will help get rid of chatter. But for most work stay on center.
5. Carbide tools should receive protection when not in use. They should be resharpened and reconditioned if necessary after being used.

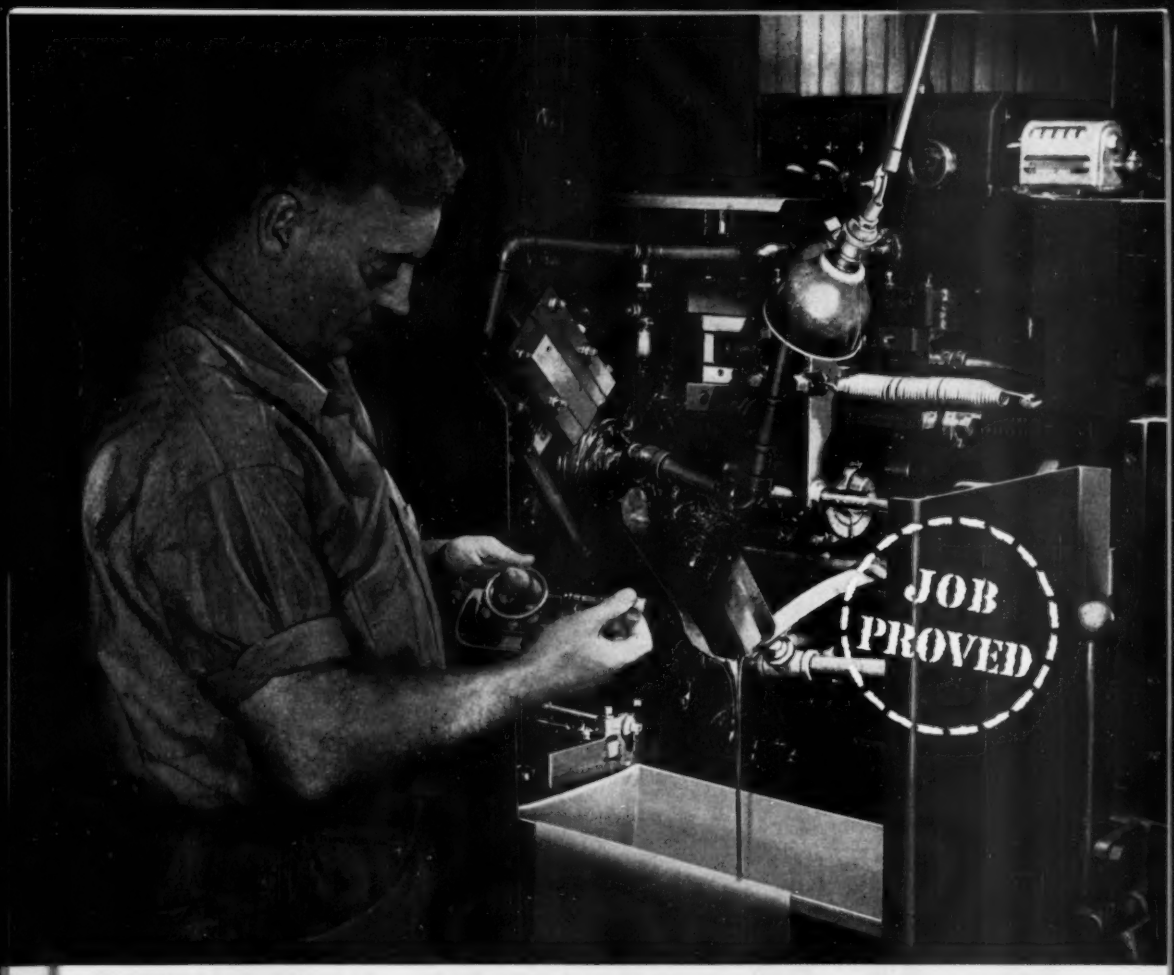
CENTRAL CONTROL

We have found central control through our carbide tooling department the best way to meet these requirements. The purchasing of materials, manufacturing of tools, storage of special and standard tools, and reconditioning of dull or broken tools are all handled in one department under one supervisor.

All tools, whether for turning, facing, or boring, are given a code number. This number designates the individual tool number in that series,

AVAILABLE STD TOOLS: Style, shank size & carbide materials in which available

STYLE NO. ⇨		01	02	03	23	33	04	24	34	05
SHANK SIZE	NO.									
3/16 × 3/16	A		A B F G						A B F G	
1/4 × 1/4	1		A B G						A B F G	
5/16 × 5/16	2		A B F G						A B F G	
3/8 × 3/8	3	A B F G H	A B F G H			A B F G			A B F G H	
1/2 × 1/2	4	A B F G H	A B F G H			B			A B F G H	
5/8 × 5/8	5	A B F G H	A B F G H	A B F G		A B F G	A B F G		A B F G H	
3/4 × 3/4	6	A B F G H	A B F G H	A B F G H	A G	A B F G	A B F G H	A G	A B F G H	
3/4 × 1	7	A G	A							A B F G H
1 × 1	8	A G	A G	A B F G H			A B F G			
5/8 × 1 1/4	9	A F G H	F G							
1 × 1 1/4	10	F H		H		G			G	A B F G H
1 1/4 × 1 1/4	11	A G	A G	A G	A G H		A G	A G H		
1 1/4 × 1 1/2	12			H	H		H	H		
3/4 × 1 1/4	13	A B F G H	A B F G H	A G	A G H		A	A G H		A B F G H
3/4 × 1 1/2	14									
1 1/2 × 1 1/2	15									
3/4 × 5/8	16	F G H								



ONE OIL DOES WORK OF TWO

Dual-Purpose Sunicut Replaces Two Former Oils; Dilution Ends; Finishes Improve; Tool Life Lengthens

When one oil does work formerly requiring two . . . and with marked superiority . . . it doesn't make good sense to keep on buying two.

That is precisely why a prominent ball bearing manufacturer changed to Sunicut. He had been using one oil for lubricating his automatics, and another for cutting, but without complete satisfaction. The lube oil kept diluting the cutting oil by leaking into it. As a result, he got poor finishes and tool life was short. A Sun representative, called in to study the situation, advised using a dual-purpose grade of Sunicut. Adoption of his recommendation solved the problem.

For three years now, Sunicut has been used by the entire automatic department with complete satisfaction. A year ago a switch was made to the *new* Sunicut with Petrofac, Sun's revolutionary all petroleum additive, and even better performance has resulted.

The new Sunicut grades, transparent and non-emulsifying, have been thoroughly "Job Proved." Excellent results are being obtained on automatics machining all types of steel and brass at all practical feeds and speeds. For further information, call or write your nearest Sun Office.

SUN OIL COMPANY · *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
·"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

Carbide Department for a Job Shop...III

the shank size, the type tool, and the grade of carbide.

We purchase carbide tips from four manufacturers and designate them as follows:

A grade—Carboloy 44A

B grade—Carboloy 883, Firth HA, Kennametal K6

F grade—Carboloy 78, Firth T16

G grade—Carboloy 78B, Kennametal K3H, Vascoloy EM

H grade—Firth TO4, Vascoloy EE

When a new tool is made it is stamped with a number such as 100-1024-H. We know that this is the hundredth tool to be made in this style and series. From the chart we can tell that the 1024 means it is 1¼-in. square (1000 series) and that it has a 15° lead angle (style 24). The H indicates that it is the grade of carbide for roughing intermittent cuts on steel.

When an operator requires a specific tool, he refers to the chart for its symbol. The tools are filed in drawer sections by number.

If a job requires a special form and time can be saved by using a form tool, the tool is made. It not only receives a tool symbol as in the standard tools, but a job symbol to indicate the operation for which it was made. Such tools are also assigned definite locations so they can be located when the job reoccurs.

A tool card for each such tool is made out. This supplies the carbide tooling department with information as to the date it was made or repaired and the operation for which it is required. On the back of the card is a sketch of the tool. Thus a duplicate can be made if needed.

AVAILABLE STD TOOLS: Style, shank size & carbide materials in which available

continued

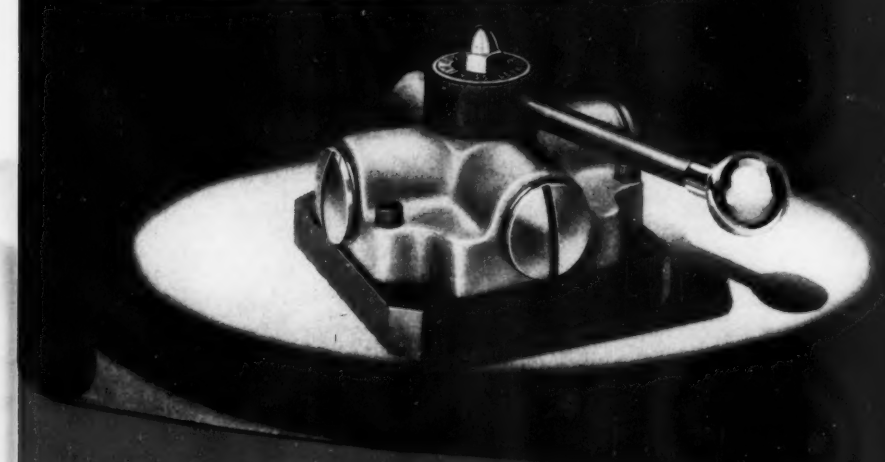
STYLE NO. ⇨	11	12	13	14	15	16	17	18	19
SHANK SIZE / NO.	RH or LH.	45°	45°		25°	25°			RH. or LH.
3/16 × 3/16 A									
1/4 × 1/4 1									
5/16 × 5/16 2									
3/8 × 3/8 3	A	A			B		A	A	A
1/2 × 1/2 4	A	A					A	A	A
5/8 × 5/8 5									
3/4 × 3/4 6					A B F G H	A B F G H	A	A	A
3/4 × 1 7									
1 × 1 8					A				
5/8 × 1 1/4 9	A		A G	G					A
1 × 1 1/4 10									
1 1/4 × 1 1/4 11									
1 1/4 × 1 1/2 12									
3/4 × 1 1/4 13	A	A G	A G	A B G	A	A	A	A	
3/4 × 1 1/2 14									
1 1/2 × 1 1/2 15									
3/4 × 5/8 16									

STYLE NO. ⇨	25	06	26	07	27	08	28	09	10
SHANK SIZE / NO.	15° 10°	10°	15° 10°	10°	15° 10°	10°	15° 10°	THREAD	THREAD
3/16 × 3/16 A									
1/4 × 1/4 1									
5/16 × 5/16 2									
3/8 × 3/8 3								A	A
1/2 × 1/2 4									
5/8 × 5/8 5									
3/4 × 3/4 6								A	A
3/4 × 1 7	A G H	A B F G H	A G H	A B F G H	A G H	A B F G H	A G H		
1 × 1 8									
5/8 × 1 1/4 9									
1 × 1 1/4 10	A G H	A B F G H	A G H	A B F G H	A G H	A B F G H	A G H		
1 1/4 × 1 1/4 11									
1 1/4 × 1 1/2 12									
3/4 × 1 1/4 13	A G H	A B F G H	A G H	A B F G H	A G H	A B F G H	A G H		
3/4 × 1 1/2 14									
1 1/2 × 1 1/2 15									
3/8 × 5/8 16									

IT'S NEW . . .

IT'S FOR MACHINE TOOLS . . .

it's a "pancake"—2" high



ROSS Introduces Poppet Valve
with Rotary Handle Action

- Seals with air pressure
- Easy to operate
- Smartly styled, clean and neat in appearance
- A 4-way unit available in ¼ and ⅜-inch pipe sizes

Ask Ross for Any Air Control Information

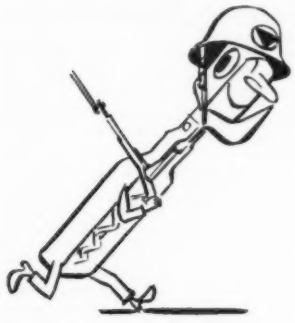
Ross makes valves only—hundreds of types and sizes. Take advantage of the experience gained in over a quarter century of concentration on control and application of air power!

ROSS Air Control VALVES

ROSS OPERATING VALVE COMPANY

120 E. GOLDEN GATE AVE., DETROIT 3, MICHIGAN

TALKING SHOP



Can Opener for Defense

AMERICA'S FASCINATION with the tin can may be the salvation of some citizens in the event of A-bomb attack. Exposed foods may be affected by radiation and glassed foods may shatter, but indications thus far are that a thoroughly washed tin can will be unaffected. That makes the can opener a civil-defense weapon—if we don't get too short of metal cans.

Accelerometer

TO TEST SPEED fluctuations in machines and small gasoline-engine crankshafts, one company uses small war-surplus 400-cycle ac motors. These motors have two field circuits. With the motor driven by the shaft under test, 6 or 12 volts dc is applied to one field winding and the recording oscillograph to the other. The result is a very accurate, non-seismatic accelerometer.

Up and Down

VERTICAL STORAGE for rod and bar is superseding horizontal storage in some Detroit plants. Reasons: reduced floorspace requirements, ease of selection from a large stock.

Sightseeing Foremen

TO GIVE FOREMEN a more intimate view of company products in use, Brown & Sharpe now sends the men out in pairs to make a week's visit to plants in various parts of the country. Trips are arranged by district sales managers, and foremen are allowed to talk to operating personnel in the various plants. The scheme has proved to be a tremendous morale builder, and has developed a feeling of personal responsibility among the foremen toward the particular plants they have visited. Many have returned with lists of suggested improvements picked up from their contacts, and have, in turn been able to suggest improved production methods to these plants.

Contract Speed

20 HOURS from arrival of fixtures, Texas Engrg & Mfg Co., Dallas, began production of Lockheed P2V main aileron spars—believed to be a speed record on parts so large. Fixtures shipped from Burbank, Calif., arrived at 4 pm one evening, were spotted by 7:30 am the next morning, released for production 45 min later —or roughly 16 hr. Loading began at 9 am, drilling at 1 pm.

Spark Line

GRAPHIC RECORDERS keep track of performance of equipment under field test for one company. Inkwell pens were unsatisfactory because of vibration, so ballpoint pen tips were substituted. These ran dry, however, because the balls ran constantly about the same axis in graphing on a moving strip of paper. The solution proved to be "Teledeltos" paper, on which a mark is made by an electric spark. This is accurate and easily read without magnification.

Carbon Removal

CARBONIZED TUBES of oil stills are now being cleaned with a blast of water and sand at 1750 psi. This eliminates disassembly for cleaning, suggests similar treatment elsewhere.

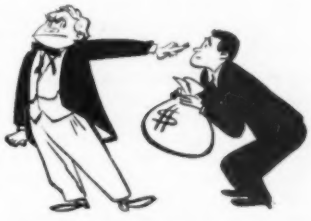
Porcelain Comes Off

THE EXPERTS told him it couldn't be done, so Arthur M. Lander, 35, president of Laundale Enameling Co., Chicago, did it. His company porcelain-enamels fabricated steel stove parts and sinks. Damaged ones were scrap heretofore. But Lander mixed caustic soda and other chemicals in a stripping tank. This bath, at 300F, will remove most of the enamel in 2 hr. Sandblasting takes off the rest. Now he has formed New Process Deenameling Co., which has contracts with Nash-Kelvinator, American Stove, Norge, Roper, and Cribben & Sexton. A separate plant has been bought in Aurora, Ill., where 30,000 sq ft will be used for de-enameling. A Government salvage contract on water and gasoline cans is in the offing.

We Pay for Empire

GOVERNMENT AGENCIES have a cute way of getting funds for pet projects, according to a recent report. First the agency gets Congress to pass an "authorization" bill—which simply authorizes the project but provides no money. Then it is easy to come back for the money for a project "already authorized by Congress."

Of course, there's frequently too much money allotted, and when one agency returned some unused funds recently, it created a near-crisis that made all the newspapers. The danger (to the agency head) is that returning money one year may mean a cut in the next-year budget.



Ten civilian agencies were recently found overstocked 70%. We now have $27 billion in military and civilian supplies stored in the U.S., and purchase records indicate they include such intriguing items as nine tablecloths and three dozen napkins for which you paid $267.45, a white nylon slip picked up for $48. One office reportedly ordered 2,634 golf clubs and 30,000 golf balls, plus 15 sets of fishing tackle at $520 each.

Nation's Business for February tells this interesting story of waste in government, adds familiar details on the buildup of department personnel to make the department head look more important. Work simplification cut one section from 28 to 16 employees—and the section chief had to transfer to another agency to escape demotion. Another agency required 21 months and 14 man-years of paper work to reduce staff from 7,000 to 5,000.

News of Metalworking

McGraw-Hill WORLD NEWS

HEAVY DIESELS WELDED — Application of welding techniques has enabled the Commonwealth Marine Engine Works to build marine diesels five times as powerful as the largest engine which Australia's limited foundry capacity permits to be assembled from castings. Six welded engines, of 280 bhp each, are under construction for use in Australian cargo vessels. An advantage claimed for the welded steel construction is a very high-power-weight ratio in comparison with other diesels of this type and rating.

SWISS MACHINERY SOUGHT — Both domestic and foreign demand for Swiss machinery and apparatus continued to increase during the final quarter of 1950. Approximately 55% of total Swiss production of machinery and apparatus is now on export account. Exports of machinery, apparatus, instruments and vehicles in 1950 reached the record value of 1130 million francs, compared with slightly over 1000 million in 1949.

NEW MINIATURE CAR— The new Champion Automobile Company in Paderborn, Austria, is to start assembly-line production of its new miniature car, the Champion 400, in April. The new car is a two-seater; the engine, mounted at the rear, has a capacity of 250cc and develops 15hp. Cost of the car is 2800 D-marks. Numerous orders have already been received from Sweden, Austria, South Africa and Australia.

NEW ENGINES PLANNED—Alfa-Romeo of Milan, Italy, is planning three new engines for sports vehicles. The first, of eight cylinders, will develop 300 hp; the second, of 12 cylinders, is intended to develop 400 hp at 10,000 rpm. The third will be a supercharged model.

1200 TRACTORS BUILT—Ford Motor Co. of Egypt, which started a giant assembly plant near Alexandria last year, has assembled 1200 Fordson tractors during 1950, which were used for Egyptian agriculture. The company is in a position to get 50 tractors off the assembly line every day and thus meet the agricultural machinery needs of Egypt and other middle eastern states.

NPA Announces 'Pool Contracts' for General Purpose Machine Tools

WASHINGTON — A program of "pool contracts" for machine tools has been announced by National Production Authority. Under Order M-40, General Services Administration, which has underwritten the project, will distribute these orders widely throughout the machine tool industry.

• **The pool contracts** are reported to total $400-$500 million. They apply to general-purpose machine tools (sometimes with special tooling) and to a limited number of presses. No satisfactory method has yet been worked out for giving pool contracts to builders of single-purpose, highly-special machine tools. If anything should be done, it is likely to be on the basis of standard units which go into such machines.

Selection of types, sizes and quantities of machines for pool contracts is based on anticipated requirements for production of materiel for the armed services and for Mutual Aid to western Europe. No figures are at hand as to the numbers of machines involved, but observers are estimating that at least 50,000 tools will be ordered. Initial wave of orders, however, will be supplemented with further orders later on as necessity dictates.

The name "pool contract" should not deceive one as to the way in which the program will operate. There is no intention of creating a central pool into which machines will go as builders produce them. Builders are to sell their machines to defense contractors, as they always have. When a machine is ready for shipment, the builder is to have a customer waiting for it. Only in case of an emergency are machines to be held after completion. The fact is that if a builder finds that his machines are not taken as they come from his plant, NPA's Machinery Division will cut the size of his pool contract to conform to the situation.

• **The GSA revolving fund** used to underwrite the pool-contract program may never have to be touched unless the defense effort suddenly and unexpectedly should be cut sharply or stopped. In such event, GSA would reimburse machine tool builders at a rate said to be 82.5% of the selling price of the machines involved. Normally the machines produced under pool contracts will be shipped direct to the contractor for whom they are intended and the contractor will pay for them as in any commercial transaction.

Pool contracts have two main assets: (1) they give builders assurance that machines started through the shop under this program will be paid for, regardless of what happens; and (2) they automatically carry DO ratings and thus enable builders to get materials and component parts. They also give the builder a chance to give a subcontractor an order for a stated quantity of machines, all covered by DO's.

Not all the pool contracts are big in volume. The number of machines of a specified type and size, in certain cases, is far less than the number already on the builder's order book. However, adjustments of quantities are bound to be made later.

No provision is made in pool contracts for builders to get cash advances up to 30% as additional working capital. For this reason—shortage of finances—some builders are reported to be reluctant to accept pool contracts and may reject them. Certain government-type loans are available to machine tool builders, to be sure, but such loans are hard to get.

• **DO-rated orders** from defense contractors will begin to be counted against the pool contract of any builder either from April 1 on, or from the data when the pool contract is received, whichever is sooner. Builders had hoped that orders on their books prior to such dates could be racked up against the pool contracts.

All pool contracts will be in the hands of builders as soon as the NPA Machinery Division can process them. The division is handicaped badly by lack of manpower, and delays may be encountered accordingly.

Classes of machines included in pool contracts are listed herewith. Additions will be made as new requirements develop.

Ammunition machinery, balancing machines, beading machines, boring machines,

MRO Order Gives Manufacturer Right to Put DO Rating on Supplies

WASHINGTON—The MRO order is both a relief and a headache for the machinery industry. It's a relief in that it represents the mobilizers' recognition of the importance of maintenance, repair, and operating supplies. Without them, plants run down and cease production. So, National Production Authority has given each manufacturer—every businessman, actually—the right to put a "DO" rating on his orders for MRO supplies.

But, there's this to remember:

When any particular MRO item becomes in short supply, every purchaser will put a "DO-97" (the MRO priority number) on the order which he places with his supplier. The supplier's entire production becomes covered by MRO orders. The result: suppliers of MRO items will still tend to take care of preferred customers ahead of less preferred.

This can be done since in these tight supply situations, the MRO priority—the "DO-97"—becomes a "hunting license." It gives the user the right to order materials; but it does not guarantee him delivery of those materials.

• **Here's what the order does:**

It permits every business to use the MRO priority on his MRO orders up to a dollar volume equal to the total dollar value of his MRO receipts during the base period—calendar 1950. The MRO quarterly quota for each plant or company is one-fourth of its base period dollar consumption of MRO items. Companies which have seasonal fluctuations may use in any quarters, if they choose, up to the dollar amount of MRO they consumed during the corresponding quarter of 1950.

Suppliers who receive orders with a "DO-97" written in by the purchaser must honor these orders ahead of "non-rated" orders—that is, orders which have no priority.

Once a company places a "DO-97" on an order for MRO, it is required by the regulation—NPA Regulation 4—to establish its quarterly quota, and to charge all its purchases of MRO supplies against its quota. The company can operate entirely outside the MRO system, if it chooses. But for most companies, this isn't likely. Also, once you have used the "DO-97," you must file a statement with NPA within 30 days, reporting your quarterly MRO quota, how you arrived at it, what your base period is, and the like.

There are provisions for new businesses, and businesses that operated during only part of 1950.

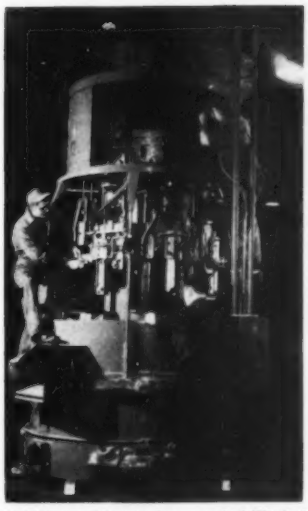
• **Of particular interest** to machinery and equipment industry is the provision in the order on "minor capital additions." The MRO provisions, in themselves, do not cover any additions to productive capacity of a given establishment. They can be used only to maintain, repair, and operate existing equipment. But, as a kind of regulatory lubricant, the MRO order permits a buyer, if he chooses, to put a "DO-97" on "minor capital additions"—that is, net expansion—of his facilities.

A buyer who has set up an MRO quota for himself is not required to put a "DO-97" on minor capital additions—which are defined, roughly, as any capital addition whose cost is $750 or less. But if the buyer does use a "DO-97" to get the minor capital addition, he must charge it against his MRO quota.

The point is that the order, as interpreted by NPA Machinery Division officials, sets no limit on the number of $750 "minor capital additions" on which a businessman may place a "DO-97" priority. Thus, it is theoretically possible for companies, by taking their expansion in $750 steps, to expand their production capacity quite legally through the use of this loophole in the MRO priority order.

brakes, broaching machines, buffing machines, centering machines, chamfering machines, crankshaft regrinders (stationary), cut-off machines, die sinking machines, drilling machines, duplicating machines, extruding machines, filing machines, forging machines, forging rolls, gear cutting machines, gear finishing machines, grinding machines.

Hammers, headers, key seating machines, lapping machines, lathes, levelers, marking machines, measuring & testing machines, milling machines, nibbling machines, oil grooving machines, pipe flanging—expanding machines, planers, polishing & buffing machines, presses, profiling machines, punching machines, reaming machines, rifle & gun working machines, riveting machines, rolling machines, sawing machines, screw & bar machines, shapers, swagers, tapping machines, threading machines, upsetters, welding machines, shearing machines, slotters.



GIANT machine tools are rehabilitated by employees at Ford Motor Company's Aircraft Engine Div. plant at Chicago preparatory to installation in production lines. More than half the machinery equipment needed to start production of 28-cylinder Pratt & Whitney aircraft engines is already in the huge Ford plant

INDUSTRIAL NOTES

• **Independent Pneumatic Tool Co.,** Aurora, Ill., has purchased Armstrong-Whitworth & Co., Pneumatic Tools, Ltd., Gateshead-on-Tyne, England, which now becomes an affiliate of Thor's subsidiary, Pneumatic Tool Co., Ltd., London.

• **Moore Special Tool Co., Inc.,** Bridgeport, will increase by 25% its facilities for manufacturing precision machine tools, through a $250,000 plant expansion program which will add 15,000 sq ft of floor space and will require $100,000 worth of new machine tools.

• **E. Horton & Son Co.,** Windsor Locks, Conn., oldest in the lathe chuck industry, this year observes its 100th anniversary. The firm was founded in 1851 by Eli Horton.

• **Norton Co.,** Worcester, Mass., has opened a new electric furnace plant at Cap-de-la-Madelaine, Quebec, which will provide a 50% increase in facilities for manufacture of silicon carbide abrasives.

• **Ready Tool Co.,** Bridgeport, recently appointed David R. Grossman Co., New York, as metropolitan New York and world wide export distributor for RED-E machine tools.

BALANCING SCHOOL — Gisholt Machine Co., Madison, Wis., will conduct a balancing school at its Madison plant, with classes scheduled to begin in late March or early April. The course will include such subjects as unbalance in rotating parts, causes and effects of unbalance, methods of applying correction for balancing, requirements of a production machine for measuring and locating unbalance, and operation and maintenance of the Gisholt Dynetric balancing machines. Cost is $100 for the two week course, $150 for the three week course.

TO INCREASE CARBIDES — A $2.8-million plant expansion program to meet rapidly increasing demand under the defense program for tungsten carbides has been launched by Carboloy Co., Inc., Detroit. Of the total, approximately $800,000 is for expansion of present Carboloy plants on 8-Mile Road, Detroit, while $2 million is for a new plant in Edmore, Mich.

WESTERN METAL SHOW — The Seventh Western Metal Congress & Exposition opens at the Oakland, Calif., civic auditorium and exposition hall March 19-23, sponsored by American Society for Metals in cooperation with 20 other national technical societies. Some 200 firms will have their new developments on display. Featured sessions will be devoted to materials and methods for airframe manufacture, and recent developments in materials and methods for aircraft propulsion units.

HOW TO RATE A JOB—A feature of the sixth annual Time Study & Methods Conference in New York April 19-20 will be the film premiere showing of "Rating of Time Studies," an eight-reel research project which offers an answer to the question, What is a fair day's work? The film shows 24 simple operations, with five different speeds for each job.

$3 BILLION IN ORDERS—Defense orders amounting to more than $3 billion are now on the books of General Motors or are represented by assigned projects. Production in quantity on most of these items will not begin until after 1951 since most projects are still in the tooling-up or make-ready stage.

Production Know-How Exchanged At Technical Sessions of ASTE

NEW YORK—The answer to the problem of manpower scarcity for defense production is to use machines which control themselves, the the nation's tool engineers were told March 16 at the Hotel New Yorker here.

Actual operating experience has proved the practicability of many automatic machines which a few years ago might have been considered only a machine designer's nightmare, according to J. M. Delfs, Machinery Div., General Electric Co., Schenectady, in a discussion at the American Society of Tool Engineers annual meeting. The discussion was part of a program of exchanging latest ideas on production know-how.

Not only do automatic machines increase output per worker, they make a better job for the machine operator, with less fatigue and less monotony. Product quality is often improved at the same time, Mr. Delfs said.

The tool engineer is the key to keeping American industry strong and dynamic for both national defense and maintaining a high standard of living, Everett M. Hicks, manager, Grinding Machine Div., Norton Co., Worcester, Mass., told the ASTE gathering.

"Tool engineers must have the imagination to grasp their opportunity," Hicks said. "Their influential position in American industrial organization gives them a unique opportunity of improving equipment policies."

Mr. Hicks urged industry to reexamine its equipment replacement policies with a view to preventing obsolescence of the American industrial machine in the future. New mathematical procedures have been established which can accurately indicate when a machine should be replaced, he said.

Following are highlights of other papers presented at the ASTE meeting:

• **Use of carbide cutting tools** rather than steel tools wherever possible in manufacture of defense or civilian products was urged by Thomas Badger, of Headquarters Manufacturing Engineering Laboratory, Westinghouse Electric Corp., Pittsburgh. Where carbides do not promise good results in an application, it is a good idea to try cast alloy tools before switching back to high-speed, Mr. Badger said. Under average shop conditions however, he added, carbide tools will reduce cutting time by 40 to over 80%. For the same tool life, speeds eight times as high or more can be used.

• **Plunge-cut grinding** as a cost-cutting, production-speeding method where close-tolerance production is involved was suggested by Frank W. Curtis, chief tool engineer, Machine Tool Div., Van Norman Co., Springfield, Mass. An outstanding advantage, he indicated, is the speed with which journals or bearing surfaces can be finish-ground to close tolerances.

• **Productivity can be increased** on older machine tools which cannot utilize the superior cutting properties of carbides, according to Dr. W. R. Frazer of Union Twist Drill Co., Athol, Mass. He described new grades of high-speed steel containing ultra-hard carbides which will accelerate performance from such machines. The new steels, he said, allow tools to be sharpened to knife-edge keenness and comparatively sharp angles (60°).

• **Speeds** at which the cutting tool moves through the steel at 16 mph or better are entirely feasible, declared W. R. Coomey, general superintendent of Rice Barton Corp., Worcester, Mass., in telling of tests made by Rice Barton. The main requirements, he added, are machines capable of the required speed and feed combinations. If speeds and feeds are increased even beyond the point where tools begin to fail from the speed being too high, Mr. Coomey said, good tool life will return and the horsepower required will be reduced.

• **Multiple thread hobs** should not only speed gear production but should also give better tool life than single thread hobs, if correctly designed and used, it was indicated by D. A. Moncrieff and Harry Pelphrey of Michigan Tool Co., Detroit. They based their comparison on equivalent total chip removal for both types of hobs. Climb hobbing generally gives results superior to conventional hobbing, they said, the prime reason being the better chip load distribution on the hob tooth.

H. H. DOEHLER, left, receives first copy off press of book, *Die Casting*, of which he is the author, from William E. Larned, vice president, McGraw-Hill Book Co. The author, a pioneer in the die casting field, who designed the first practical die casting machine nearly 50 years ago, is chairman of the board of Doehler-Jarvis Corp., New York

Distribution of Metalworking Machines Regulated by New Order

WASHINGTON—To distribute metalworking machines to places where they will be of greatest benefit to the defense effort, Order M-41 has been issued by NPA allocating 70% of deliveries to armed services and remaining 30% to other users, beginning April 1. Order M-41 is the 1951 equivalent of General Preference Order E-1-B used in World War II.

Order M-41 calls for a 90-day frozen period for builders' order boards, during which delivery schedules cannot be changed except by an emergency "diversion directive" for an individual machine. Present schedules will not be disturbed until July 1. But starting April 1, and on the first of each succeeding month, each builder is to schedule his deliveries of each size of machine for the fourth ensuing month in accordance with the preferences set up. On April 1, for example, he will schedule his July deliveries.

Builders will be asked to submit their order boards monthly to NPA's Machinery Division, where they will be under the supervision of a staff headed by Paul Gaston.

Distribution of the 70% of production among armed services agencies will be based on a "percentage allocation schedule" made up by NPA after consultation with the Munitions Board. The percentage of allocation is likely to differ with each type and size of machine. Copies of the allocation schedule, classified "Restricted," will be furnished to equipment builders.

• **Foreign orders,** including British, are included in the 30% allowed to "other purchasers" after the services have taken their 70%. However, British are in an advantageous position, because their orders will have DO ratings and will be at the head of the 30% list. They may well get some of their requirements faster, as a result, than the services.

M-41 provides that in applying or extending a DO rating to an order for a machine, any service purchaser or other purchaser must indicate the service agency or other claimant agency which placed or sponsored the prime or subcontract for which the machine is to be used, and the required delivery date.

If a builder does not have on hand enough firm orders to equal the quota of any service group, at the time he schedules his monthly deliveries, he is permitted to distribute the unscheduled balance over the other service groups by a specified formula.

Order M-41 applies to all types of the following classifications of metalworking machines:

Amunition machinery, balancing machines, beading machines, boring machines, brakes, broaching machines, buffing machines, centering machines, chamfering machines, crankshaft regrinders (stationary), cut-off machines, die sinking machines, drilling machines, duplicating machines, extruding machines, filing machines, forging machines, forging rolls, gear cutting machines, gear finishing machines, grinding machines.

Hammers, headers, keyseating machines, lapping machines, lathes, levelers, marking machines, measuring & testing machines, milling machines, nibbling machines, presses, profiling machines, punching machines, reaming machines, rifle & gun working machines, riveting machines, rolling machines, sawing machines, screw & bar machines, shapers, swagers, tapping machines, threading machines, upsetters, welding machines, shearing machines, slotters.

4787 at Contract Exhibit

NEW YORK—A total of 4787 potential subcontractors attended the two-week exhibit and production clinic staged here by 27 prime contractors and the New York Air Force procurement office. Of those manufacturers checked in, 93% were small manufacturers (having less than 500 employees each), the Air Force reported.

Thor Will Produce Shells

CHICAGO—Thor Corp., a major producer of home laundry appliances, has received a large Army order for manufacture of artillery shells. Dollar amount was not disclosed. This is the first defense production order awarded Thor since World War II, when the company was a leading producer of shell boosters. The shells will be manufactured at Thor's Bloomington (Ill.) plant.

Solar Aircraft Expands

SAN DIEGO—Orders and letters of intent on hand have caused Solar Aircraft Corp. to authorize construction of a 300,000 sq ft plant at Des Moines, about one mile from its present plant in that city.

Ford Gets Ammunition Job

DEARBORN, Mich. — Ford Motor Co. has been awarded a $7-million letter-of-intent order by the Army to build ammunition parts, to be produced at the Highland Park Div. plant.

Everett K. Morgan

Roy I. MacArthur

Don F. Taylor

Harold S. Sizer

Names in the News

Everett K. Morgan has been named general sales manager for the mechanical press line of Danly Machine Specialties, Inc., Chicago. He had been with Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., as vice president in charge of sales and manager of engineering, from 1937-1951. Before joining Giddings & Lewis he had been with Rockford Drilling Machine Co., a Borg-Warner Div., as general superintendent, and in 1922 joined Ingersoll Milling Machine Co., Rockford, Ill.

Walter E. Carlson has been named works manager of the five Standard-Thomson Corp. manufacturing plants at Dayton, Ohio. He was formerly superintendent of plants 1-A and 1-B. **Carl Nixon** was named assistant works manager. **F. H. Schroeder,** vice president and director of Lee Higginson Corp., has been elected a director of Standard-Thomson.

Walter Zimmermann has been named district manager for Colombia Tool Steel Co., Cincinnati, and will have charge of the tool steel warehouse and office at 2716 Spring Grove Ave., Cincinnati. His territory includes the southern half of Ohio, and the states of Kentucky, Tennessee, Alabama, Florida, Mississippi, and Louisiana. He replaces **James Terry,** resigned.

Herbert W. Marx has joined the sales force of Hanson-Van Winkle-Munning Co., Matawan, N. J., and will serve in the field with headquarters in Detroit.

L. H. Hirsch has been named chief electrical engineer, Century Electric Co., St. Louis.

Roy I. MacArthur has been named general superintendent in charge of aircraft engine manufacture for Buick Motor Div. of General Motors Corp., Flint, Mich. **Don F. Taylor** was named assistant general superintendent in charge of tank transmission manufacture. Mr. MacArthur has been superintendent of the forge plant since 1945; Mr. Taylor has been assistant director of inspection since 1949.

Edwin J. Heimer has been named sales manager of hand lift and motorized hand trucks by the Philadelphia Div., Yale & Towne Mfg. Co. He formerly was a vice president of Clapp & Poliak, Inc., and previously was president of Barrett-Cravens Co., Chicago. **Albert A. Goodman** was named manager of quality control for the Philadelphia Div. He formerly was with Westinghouse Electric's Steam Div. in Philadelphia as supervisor of quality control, and before that with Service Instrument Co. and RCA-Victor.

Henry E. Warren, Jr., has been named assistant general superintendent of the new Fairless Works, United States Steel Co., to be built at Morrisville, Pa. **Forest J. Smith** was named assistant to the general superintendent.

Dr. John F. Thompson, president of International Nickel Co. of Canada, Ltd., was elected to the additional office of board chairman, succeeding the late **Robert C. Stanley. Dr. Paul D. Merica,** executive vice president and a director, was elected a member of both the executive committee and the advisory committee.

Harold S. Sizer has been named director of design for machine tools, Brown & Sharpe Mfg. Co., Providence R. I. He assumes charge of engineering on machine tools and related items. He has served Brown & Sharpe as design analyst, standards engineer and assistant director of design. Mr. Sizer is also chairman of the Technical Standards Committee of the National Machine Tool Builders Association.

Carl L. Kalitta has been named chief design engineer, Warner Div., Clinton Machine Co., Detroit. For ten years previously he was with Vickers, Inc., Detroit, specializing in aircraft hydraulics. **V. R. Peiffer** has been named director of production of the Warner Div. He was assistant plant manager of Bowen Products Corp., Ecorse, Mich.

A. H. Rosenbloom has been elected vice president, Joseph Behr & Sons, Inc., Rockford, Ill. He has been in charge of the Machine Tool & Industrial Div., which serves as dealers, distributors and rebuilders of new and used machine tools and industrial equipment.

T. W. Haines has been named district manager for Philadelphia and eastern Pennsylvania by Morse Twist Drill & Machine Co., New Bedford, Mass. **W. T. Rogers** has been appointed territory representative to work with Mr. Haines, who has been succeeded as representative in New York City by **R. W. Kuhn. R. E. Bennett** has also been named representative in New York.

Donald F. Kittredge has been named manager of sales, Railway Div., National Malleable & Steel Castings Co., Cleveland. He succeeds **Ellsworth H. Sherwood,** recently made assistant vice president sales, Railway Div.

Alex G. McKenna

C. J. Gerker

William F. Weinreich

E. C. Iverson

Alex G. McKenna has been named executive vice president, Kennametal, Inc., Latrobe, Pa. **John C. Redmond** has been elected vice president in charge of metallurgical development, and **Richard J. Flickinger** was elected assistant secretary. Recent sales appointments: **Bennett Burgoon, Jr.,** assistant to the general sales manager; **Gilbert Bunn,** manager of the Detroit-Cleveland district, succeeding Mr. Burgoon there; **Douglas C. Cunningham,** formerly Detroit district representative, named Philadelphia-New York district manager, succeeding Mr. Bunn in that post.

Robert M. Critchfield has been named assistant general manager of General Motors' Allison Div., Indianapolis, after serving since 1947 as factory manager of the Delco-Remy Div., Anderson, Ind.

C. A. Wagner, with headquarters in Dallas, has been appointed by Billings & Spencer Co., Hartford, Conn., as direct representative for Texas, Arkansas, Louisiana, and Oklahoma.

Paul M. Arnall has been elected president, Lunkenheimer Co., Cincinnati, succeeding **Frank P. Rhame,** resigned. Mr. Rhame will continue as a director and in an advisory and consulting capacity.

Capt. David R. Hull, USN (Ret.), has been elected a vice president of Raytheon Mfg. Co., Waltham, Mass., and named manager of the Equipment Divisions, succeeding **Wallace L. Gifford,** who continues with Raytheon as a director and vice president in an advisory capacity. In World War II, Capt. Hull was assistant chief Bureau of Ships, for electronics. Following the war he was executive vice president and director of Capehart-Farnsworth Corp., a vice president and director of Federal Telecommunications Laboratories.

C. J. Gerker has been named general manager, Ohio Hoist & Mfg. Co., Cleveland. He was formerly vice president and general manager of Midway Tool Co., Inc., Melvin, Ohio. Mr. Gerker will be in charge of Ohio Hoist's factory at Lisbon, Ohio, and the company's executive offices in Cleveland. He will also direct sales of the company's products through distributors.

Eric O. Meimer has been named secretary and chief engineer of Jervis B. Webb Co. of California, Los Angeles.

Patrick J. Patton has been named Milwaukee manager for the Commercial Sales Div., De Laval Steam Turbine Co., Trenton, N. J. Before joining De Laval in 1950, he was a regional sales supervisor for Worthington Pump & Machinery Corp.

Donald W. Douglas, Jr., has been named vice president-military sales, and **Harry Woodhead** was named vice president in charge of the newly activated Tulsa Div., Douglas Aircraft Co., Santa Monica, Calif. Mr. Douglas also retains his post as operations director of testing. Mr. Woodhead, who was wartime president of Consolidated Vultee Aircraft Corp. was recently named general manager of the Tulsa Div., where he will direct production of B-47 Stratojet bombers. **Eric Springer, Fred Herman** and **Leo Carter** have been named to newly created posts of operating division general manager, with Mr. Springer at El Segundo, Mr. Herman at Long Beach, and Mr. Carter at Santa Monica.

Dan T. Buist has been named national sales director of Turco Products, Inc., Los Angeles, succeeding **Lou H. Moulton,** retired. **Joe Hart** has been named manager, Metal Processing Sales Div.

William F. Weinreich, formerly assistant superintendent of machine shops at the Buffalo plant of Worthington Pump & Machinery Corp., Harrison, N. J., has been named in charge of the newly acquired Oil City, (Pa.) plant. He will be assistant to **Austin C. Ross,** vice president, who is in administrative charge of the plant. **A. William Fraser,** formerly general European manager, has been named midwest sales manager of Worthington. He will direct sales of Chicago, St. Paul, Kansas City and St. Louis offices.

E. C. Iverson has been named chief engineer, Towmotor Corp., Cleveland. He has been associated with J. D. Adams Mfg. Co., Indianapolis, in charge of all product design and development.

Ancel C. Adams has been named general plant superintendent of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Gordon E. Hann has been elected vice president in charge of research & manufacturing, Tremco Mfg. Co., Cleveland and Toronto.

OBITUARIES

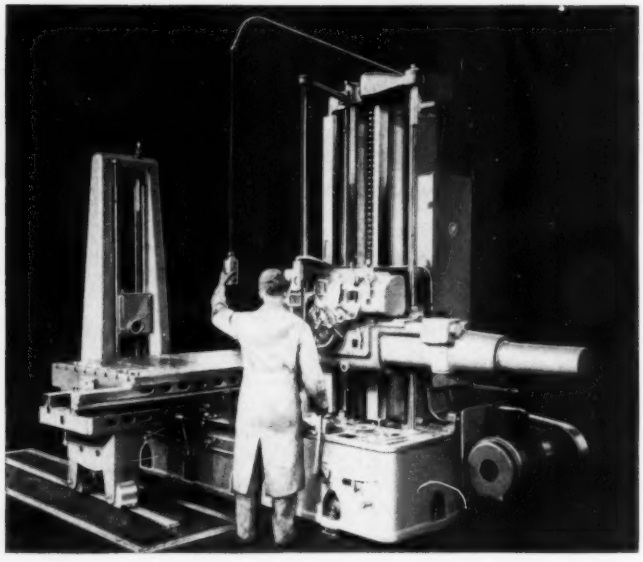
Edward W. Hart, 57, production manager for S. K. Wellman Co., Cleveland, died February 2.

Earl L. Kremer, associated with Lake City Malleable Co. for 17 years, died Feb. 9.

Russell L. Peck, refractories engineer for Norton Co., Worcester, Mass., died Jan. 23, in an automobile accident in Tallulah, La.

Fred M. Zeder, 64, vice chairman of Chrysler Corp., Detroit, died Feb. 24. He was also vice president in charge of engineering.

New Shop Equipment



Selection of 45 Spindle Speeds On G & L Horizontal Boring Machine

Speeds from 10 to 1300 rpm through 45 changes can be made on this single-spindle horizontal boring, drilling, and milling machine. Advantage claimed—closer selection permits increased machining efficiency since tool and workpiece-material speed requirements can be better fulfilled.

Six new structural features have been added to the basic machine which are claimed to increase its capacity and improve performance. Two of them, hardened bed and saddle ways using a new method of doweling, and an automatic positioning device have been previously described (*AM*—Nov. 27 '50, p. 149 and 164). The others are:

The spindle is of nitralloy steel with a 4-in. dia and a travel of 30 in. It rotates on anti-friction bearings.

An electric push-button control station having forward, reverse, stop, and inch buttons is provided in a swiveling pendant suspended from the top of the machine column. It can be swung in a semicircle.

Simplified changing of gears is provided by two hand cranks and a direct-reading dial.

To meet the demands of higher cutting speeds and heavier loads, gears are being cut and shaved, followed by hardening. Close tolerances are said to be held during manufacture to minimize backlash. They run in an oil bath, a pump circulating the oil from a reservoir in the headstock to the moving parts.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

(MORE DATA? CIRCLE FYI 31, p. 193)

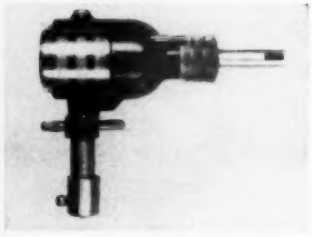
Barton Flexible-Shaft Tool →

The handpiece of this tool is ball-bearing mounted—claimed to be cool running. A bail is included for hanging up the motor. The high-speed shaft is 4 ft long. Choice of either ¼ or ⅛-in. collet.

The motor used is a Black & Decker, or equal, ¼-hp., single-phase, 60-cycle, and 110 v. Maximum rpm is 6,000.

Barton Products, Inc., Defiance, Ohio.

(MORE DATA? CIRCLE FYI 32, p. 193)



Adjustable Stroke Features Swedish Tool and Die Filer

The Diprofile can be used for filing, honing, polishing, and lapping on inner an outer surfaces; for routing and sawing, and is said to work on practically all materials, from the hardest carbide bit to glass, plastics, and fibrous materials such as wood.

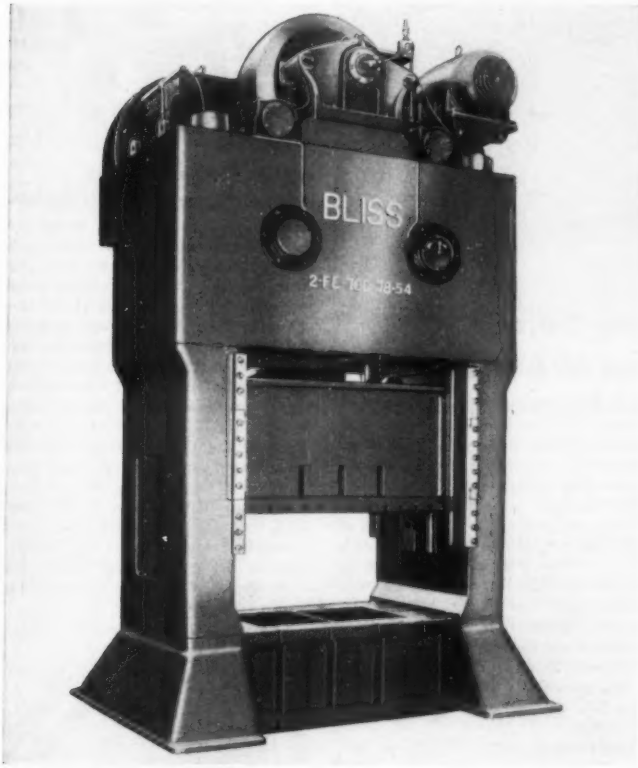
An adjustable stroke makes it possible to work in shallow holes. It can be mounted in a lathe for work on rotating surfaces, and can be used for broaching small conical holes in die blocks.

It is driven from a controllable 10,000-rpm electric motor of 1/10-1/8 hp through a flexible shaft. Files, drills, and various hand-pieces are available. Price is $75 for the tool itself. Motor is supplied only when requested.

Nord International Corp., 50 Church St., New York 7, N. Y.

(MORE DATA? CIRCLE FYI 33, p. 193)

Materials and Parts



Bliss Eccentric Presses Withstand Severe Pounding

A line of two-point eccentric presses have been developed for general-purpose blanking, forming, and drawing. To withstand severe round-the-clock operating conditions, the two main-gear eccentric units are designed with unusually heavy sections. They are mounted on and keyed to large-dia shafts.

Torsional and axial deflections are reduced by having the shafts revolve in crown bushings. Maximum rigidity is claimed because of the use of short uprights and deep crown sections.

Lubrication is automatic, consisting of a combination of cascade and pressure types. The drive is double-geared, with two separate intermediate shafts running in an oil bath.

The dimensions and specifications are in accord with the standards established by the JIC. The Bliss single-disk pneumatic friction clutch is furnished as standard equipment. It is claimed to be cool-running and to require no adjustment, since the clutch and brake plates are self-centering and wear on the friction surfaces is compensated automatically. Replacement of worn-out friction plates is accomplished without disassembling the clutch, or any part of the press. The brake is integral with the clutch.

E. W. Bliss Co., Canton Ohio.

(MORE DATA? CIRCLE FYI 34, p. 193)

... INCLUDING

Milling and center drilling are done semi-automatically at rate of 220-240 pieces per hour . . page 186

Rotary table for the smaller knee-type millers is built for manual or power feed . . . . . page 187

Polishing machine employs centerless taper feed, using rubber roll as a feeding member . . page 188

Wax blends, used in deep drawing as a lubricant, increase amount of draw possible . . . . . page 189

Thread and worm grinders use longitudinal and plunge-cut feeding depending on wheel used . . . . . page 190

Tableway lubricant passes friction test; reduces chatter at slow table speeds . . . . . page 200

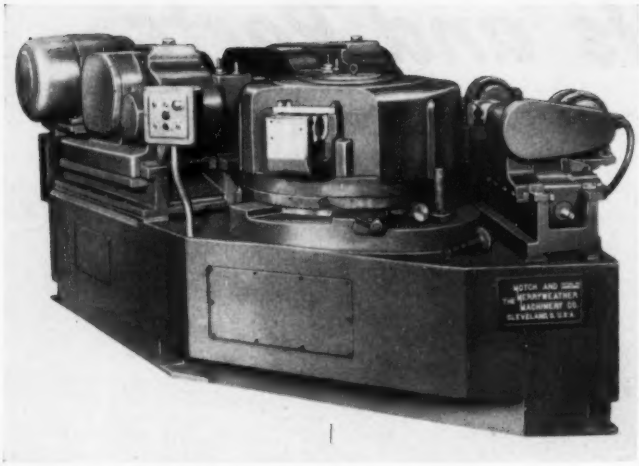
Powershear employs a variable-speed stroke within a speed range of 30 to 200 rpm . . . . . page 202

NEW BULLETINS for your Shop Library, including a carbide-grade chart for chip removal, wear, and impact uses containing the newest grades . . . . . pages 193 and 194

... and in April 2

Metal-powder press combines hydraulic and mechanical advantages to increase capacity and improve tolerances.

Optical follower for precision hole-spacing work replaces the tracing finger used on conventional machines.



Milling, Center Drilling Done Semi-Automatically on M & M Machine

Forgings or shafts from 4- to 16-in. length can be processed at a production rate of 220-240 pieces per hour on this machine. Both ends are milled and center drilled simultaneously while the operator is loading and unloading.

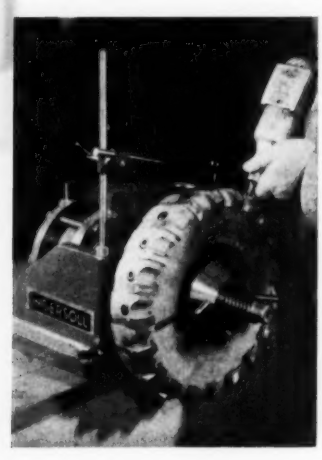
A 48-in. table holds three clamping fixtures, opposed M-30 milling heads, and opposed single-speed drilling units mounted on a heavy welded base.

The machine cycle is semiautomatic, the operator loading the work and depressing a lever to clamp the stock through vise jaws. A button is then pressed, causing the index table to rotate 120°. The milling heads rapid advance, feed, and rapid return. The table then indexes 120° to the drilling station for double-end operation. During the index to the unloading point, the vise automatically opens.

The milling heads are capable of face milling alloy-steel pinions at a 24 to 30 ipm feed rate; utilizing up to 30 hp. They have 2 in. of quill adjustment for cutter setting and wear. Lubrication of all moving parts is automatic. Hydraulic pump is driven by a 7½-hp motor.

The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio.

(MORE DATA? CIRCLE FYI 35, p. 193)



Ingersoll Milling-Cutter Vise Has Power-Operated Jaws

Vise made by Ingersoll enables inserted-blade cutters to be held firmly in place while the blades are being reset. Wedges can be driven and screws tightened more rapidly. The jaws are opened and closed by an air-pressure valve as the operator indexes the cutter. A pointer mounted on the vise is used in setting each blade to the same height.

Arbors for cutters with 1½- and 2½-in.-dia bores are standard equipment; other arbors are available as special equipment.

The Ingersoll Milling Machine Co., 2401 Douglas St., Rockford, Ill.

(MORE DATA? CIRCLE FYI 36, p. 193)

Multiple-Discharge Tracks Increase Capacity of Parts Feeders

The capacity of these vibratory feeders can be doubled or tripled by equipping them with two or three feeding tracks instead of only one. Movement of parts is in the same direction on all tracks and the discharges may be located all at one point or at various points around the circumference of the bowl, wherever convenient to the processing stations. Thus, the units not only increase the rate of feed, but also permit the use of more processing stations, more counting devices, etc.

The smaller models, EV-01 and EB-1, can be furnished with two feeding tracks while the larger models, EB-2, EB-4, and EB-5, can be equipped with up to four feeding tracks.

Syntron Co., 311 Lexington Ave., Homer City, Pa.

(MORE DATA? CIRCLE FYI 37, p. 193)

Federal Dimensional Air Gage Has 0.003-in. Range

The 0.003-in. range of this gage is claimed to enable the user to determine the size of a hole before he reaches the ultimate size required. Irregular and tapered holes are more easily gaged.

The jeweled-bearing meter is cushioned at both ends of travel to prevent damage. Any air pressure

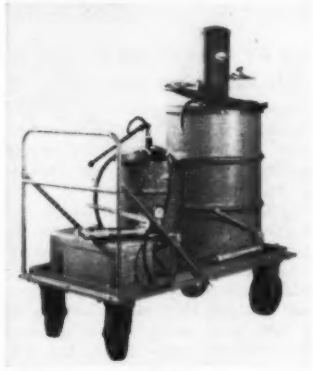
between 40 and 100 psi can be used. Pressure at the jets enables the plug to be used in coolants or oil. Greater plug clearance prevents grit and dirt from interfering.

The gage measures the dimensional variation directly on its graduated scale. Each graduation represents 0.00005-in. Amplification is 2500 to 1. The accuracy is claimed to be so dependable that only one master is required for setting. Tolerances are read directly on this scale, just as on a dial indicator. Variations to 0.000005 in. can be determined.

Gage plugs and its hole connections are made finger-tight without wrenches and no major adjustments are required when plugs are interchanged. Plugs are chrome-plated and have larger no-clog jets, and since they have deeper recess clearance they are claimed to wear longer. Two handles, 2 and 4 in. long, are available; by screwing them together a longer size can be made. The gage measures 9x7⅝x8½ in.

Federal Products Corp., 1144 Eddy St., Providence 1, R. I.

(MORE DATA? CIRCLE FYI 38, p. 193)



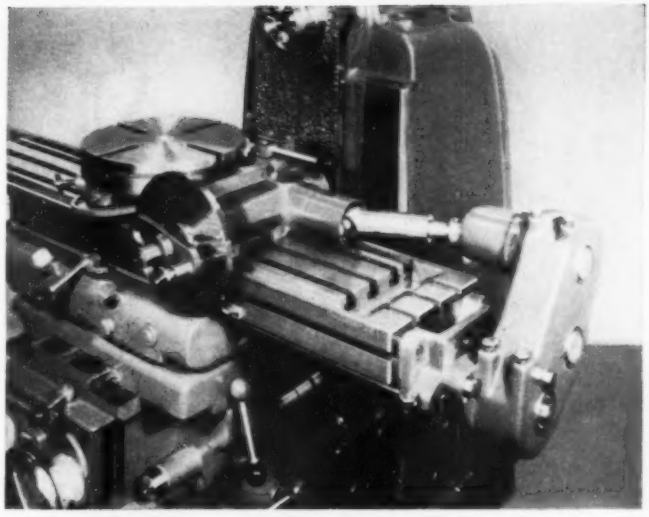
Fauver Lubrication Kit Reloads Grease in Bearings

Portable lubrication outfit, known as LubriKit, consists of an electrically operated barrel pump, mounted on a 400-lb drum, for the filling of grease reservoirs; a hand transfer pump on a 100-lb drum for the delivery of oil, and a tool box containing hand tools, miscellaneous fittings, and hand guns for individual bearings.

The necessary hose, nozzles, and gages are included, mounted on a steel base 30 x 60 in. with 10-in. dia rubber casters; two solid and two swivel for easy maneuvering.

J. N. Fauver Co., Inc., 49 West Hancock, Detroit 1, Mich.

(MORE DATA? CIRCLE FYI 39, p. 193)



Cincinnati Rotary Table Built for Manual or Power Feed

Attachment for the smaller knee-type milling machines is intended primarily for toolroom work, but when properly set up, can be used for production work.

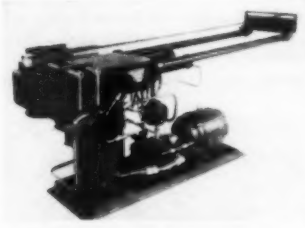
It is built in two styles—power and manual feed. The table is 12 in. in dia; machined with four standard T-slots; rotates through a worm and wheel having a 80 to 1 ratio; and is graduated in degrees on its circumference. The handwheel dial is graduated in minutes.

The powerfeed attachment is driven by the miller. A shaft beneath the table and parallel to the feedscrew drives a gear train that is within a bracket on the right-hand side of the table. Power is transmitted from the train to the attachment by a universal-jointed, telescoping shaft. A reverse clutch permits the table to be driven in either direction, or to be disengaged for manual adjustment.

Both styles may be equipped with an auxiliary indexing attachment.

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

(MORE DATA? CIRCLE FYI 40, p. 193)



Wallace Hydraulic Bender Operates by Single Lever

This compact bending machine is 21 in. wide x 34 in. high x 78 in. long, and is claimed to have power well beyond its capacity of 1¼ in. OD x No. 16 B.W.G. steel tubing. The unit is powered by a standard 2-hp, 220/440-volts, 3-phase, 60-cycle motor.

It is operated by a single lever which when pushed down causes the bending arm to swing around to the degree of bend selected and stay there until the operator has removed the bent part, then the lever is moved up and the arm swings back to its original position.

The bending die is held on by spring clips which are said to make changing easy. A combination die is used with four different sizes, one to each size.

The unit can be changed from a righthand to a lefthand bender by changing the pressure and clamping arms over and inserting the bolts into holes for that purpose. Maximum radius adjustment is 8 in, mandrel extractor length is 5 ft 6 in.

Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill.

(MORE DATA? CIRCLE FYI 41, p. 193)

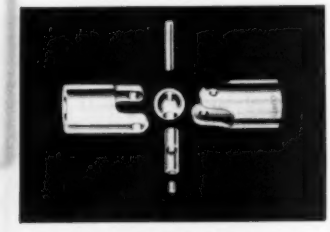
Brake With Dead-Man Control on Towmotor Electric Pallet Truck

The Model "W" truck is built to handle loads weighing up to 4000 lb. Features are a contactor panel, a positive-action brake with dead-man control, improved differential action, and all-rubber, dual trailer wheels for smooth operation.

Operator controls are located for finger-tip operation with either right or left hand, making it possible for the operator to work from any angle in picking up or depositing loads. A key switch provides turnoff power to the dual-control buttons, preventing accidental or unauthorized use of the truck.

Towmotor Corp., Cleveland 10, Ohio.

(MORE DATA? CIRCLE FYI 47, p. 193)



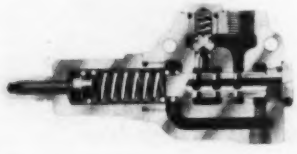
Curtis Universal Ball Joint For Light-Duty Applications

Joint made by Curtis is for applications not requiring heavy-duty, higher-priced joints. It can be used for the transmission of light torque loads around corners, or from one member to another which is slightly out of line.

Steel forks bear on a bronze ball, with heat-treated centerless-ground pivot bearing pins. The large pin is provided with an oiler for the lubrication of all bearing points. The ball surface gives minimum friction loss and long life for light load transmission or for hand-operated control. All sizes are furnished with riveted small pin. Available in four sizes: ½, ¾, 1 in., and 1¼ in.; single or double, solid or bored hubs.

The Curtis Universal Joint Co., Inc., Springfield, Mass.

(MORE DATA? CIRCLE FYI 48, p. 193)



Hydreco Pressure-Reducing Valve

These plunger-operated valves, designated as the VA Series, are so designed that individual hydraulic units may be operated with reduced pressure and without changing the normal system pressure. As bleed-off in the valve is accomplished through the main control plunger rather than through an auxiliary or pilot plunger, hunting is said to be reduced and steadier output pressure assured.

Available for capacities up to 15 gpm., with pressure settings of 100 psi to 300 psi or from 200 to 1000 psi.

Hydraulic Equipment Co., 110 E. 222nd St., Cleveland 17, Ohio.

(MORE DATA? CIRCLE FYI 49, p. 193)

Spo Air Vibrators Have Wide Application Range

These units are available in eight standard sizes and can be furnished with a long or standard-stroke piston to get the correct power intensity.

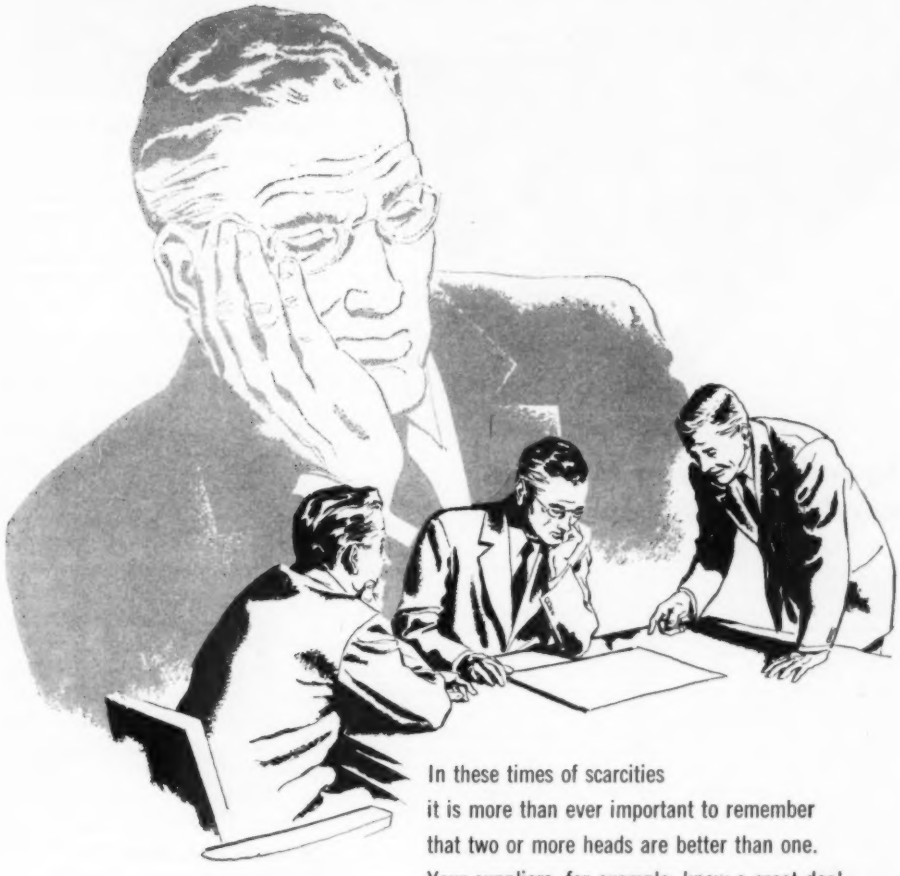
Designed for standard 80-psi line pressure, the vibrators are recommended for use on hoppers, tables, molding machines, chutes, and other production equipment. For hopper installations, they can be used with a SPO gate valve, which actuates the vibrator only when the discharge gate is open. In this way, accidental packing of hopper contents by premature vibration is prevented and air power is conserved.

The bodies are cast from semi-steel. The combination end-plate mounting bracket is held positively in place by 1-in. alloy-steel bolts. A bronze-alloy cylinder liner is claimed to give smooth, positive operation and provide a long service life.

The vibrators are available in 2 and 2½-in. piston diameter with either stroke. All models are tapped for ¼-in. rigid or swivel type, straight or L-Connector for hose attachment.

Spo Inc., 6430 Grand Division Ave., Cleveland 25, Ohio.

(MORE DATA? CIRCLE FYI 50, p. 193)



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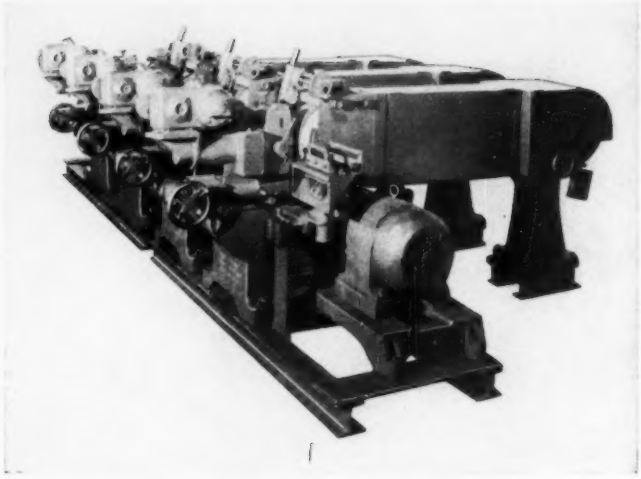


High-Speed Polishing Machine Employs Centerless Taper Feed

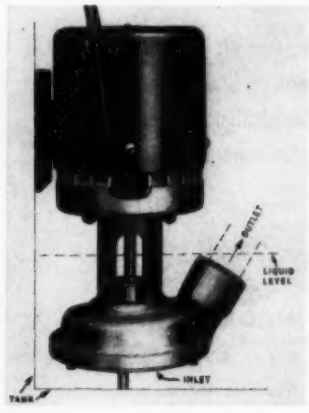
Shown for the first time at the Chicago Metal Show, a tandem installation of these machines polished welded steel tubing at 70 lineal fpm, said to be very high for this type of work.

A centerless taper feed is employed, using a rubber roll as a feeding member which can be tilted for varying the rate and lineal fpm as desired. Ball-bearing slide automatically allows the feed roll to follow the taper of the work. Straight pieces may also be done with this unit. A separate motor with variable-speed pulley permits infinite range of rotation of feed belt or roll. It may be adjusted to rotate from 40 to 100 rpm. Wheel head adjustment is operated by a large hand wheel and positive locking lever. It is for diameters of wheels from 10 to 16 in.

Because of the high speed of operation and the fact that most tube-polishing operations require several passes, these machines are usually installed in tandems of from two to six units. The photograph illustrates a typical installation of four machines, the first three equipped with idler backstands and the fourth arranged to use a buff for final operation. Adjustable roller fixtures support the work as it automatically passes from one machine through to the final operation.

Production Machine Co., Greenfield, Mass.

(MORE DATA? CIRCLE FYI 51, p. 193)



Taco Coolant Pump Uses Stainless-Steel Shaft

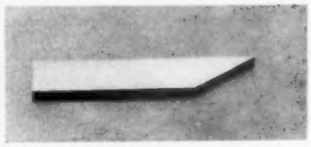
This small pump can be used as a coolant pump or in any application where it is desired to move water or soluble oils not under pressure.

It has a bronze body, bracket and impeller, and a stainless-steel shaft. No seals or lubrication are required. The intake has a built-in filter screen.

Capacity is 10 gpm against a 3-ft. head. Connections are a 1-in. hole in inlet plate located below the water line; the outlet is ¾ in. N.P.T. A 1/25-hp. motor is used.

Taco Heaters, Inc., 137 South St., Providence 3, R. I.

(MORE DATA? CIRCLE FYI 52, p. 193)

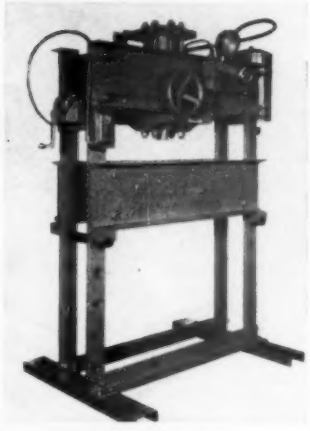


Starrett Tungsten-Carbide Scribers

The point on this scriber is made of long-wearing tungsten carbide. It is said to scribe sharp, well defined lines on the hardest of materials. Available in two sizes for the No. 454 Starrett 10-, 18- and 24-in. vernier height gages and interchangeable with the standard scribers on these gages.

The L. S. Starrett Co., Athol, Mass.

(MORE DATA? CIRCLE FYI 53, p. 193)



150-Ton Bending Press Uses Electric-Hydraulic Controls

Elect-Draulic press made by Lempco will do a variety of shop work and production pressing. Riveting, pressing, bending, straightening and broaching heavy assemblies are some of its uses.

Special controls run the ram down to the work quickly and build pressures rapidly to pre-selected tonnage. The ram kicks off at the required setting, thus eliminating the danger of spoilage or mashing rivets. Hydraulic operation in both directions gives powerful ram retraction, enabling the press to be used for stripping or operating full broaches. Ram speed is 12 to 13 ipm, with a ram travel of 12 in.

The roller-mounted ram and cylinder unit can be moved across the entire width of the press. The bolster is raised or lowered by a hand crank.

Lempco Products, Inc., Bedford, Ohio

(MORE DATA? CIRCLE FYI 54, p. 193)

NEW DRILLING PROBLEMS?

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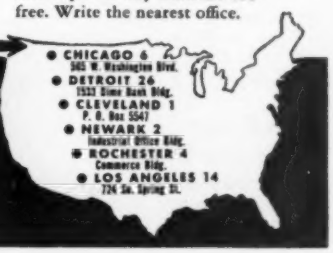
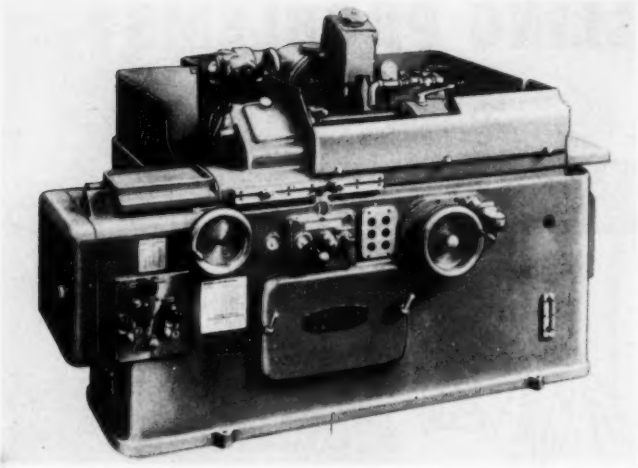


LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U.S.A.



Universal Thread and Worm Grinder Uses Longitudinal and Plunge-Cut Feed

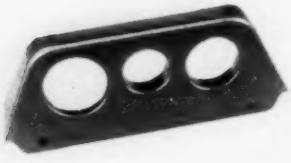
This grinder can be applied to both thread and worm grinding; in both production and toolroom operations. With suitable attachments, it will grind internal threads up to 5-in. dia; and, to grind and relief-grind external threads, right- or left-hand, single or multiple. Threads can be ground to any desired profile.

Known as the NRK, it operates on two different grinding methods: A longitudinal feed principle for single-thread grinding wheels; and, an in-feed or plunge-cut principle for multi-thread grinding wheels. The first method is used for grinding thread gages, spindles, worms, and long-thread taps and when the length of the thread is more than 1.575 in. The in-feed method is for production grinding of small thread taps, thread-milling cutters, thread chasers and threads on screws, bolts, or similar parts requiring ground finishes.

It takes workpieces between centers up to 28 in.; grinds threads to a maximum length of 17½ in. The single-thread grinding wheel is 0.32 in. wide, while the multi-thread wheels are 0.8, 1.2, and 1.6 in. It operates on 220 and 440 volts, 3-phase, 60-cycle current.

The Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

(MORE DATA? CIRCLE FYI 55, p. 193)



Wax, used as a lubricant, is claimed to have permitted this stainless-steel part to be drawn 50% beyond theoretical capacity of the metal

Johnson's Wax Used in Deep Drawing

Tests conducted in metalworking plants are claimed to show that special blends of wax used in place of conventional lubricants permit the drawing of stainless steel far beyond its theoretical capacity. They are also being used as a replacement for the copper flashing on stainless-steel wire used for cold heading, and in the drawing of aluminum. It is said that the use of wax as a lubricant extends the life of tools and dies and in some cases eliminates the extra operation of degreasing drawn parts.

A large electrical-equipment manufacturing plant using waxes as a drawing lubricant found that blanks of No. 405 stainless can be drawn 50% beyond the theoretical capacity of the metal. After a production run of over 2000 pieces, the tool wear was claimed to have been so slight that it could not be determined with standard measuring devices.

The same material is being employed for various cold-heading operations. It can be applied to wire by dipping the coil in a wax solution and allowing it to dry, or it may be applied just before the wire enters the cold-heading machine. When square shoulders are involved in the upsetting operations, they are claimed to fill in better when wax is used.

A screw manufacturer is claimed to have discovered that the torque of self-tapping screws could be reduced 50% if they were given a coating of a wax blend.

S. C. Johnson & Son, Inc., Racine, Wis.

(MORE DATA? CIRCLE FYI 56, p. 193)

Automatic Lubrication Provided In Boston-Gear Pillow Blocks

Stock line of self-aligning, ball-bearing pillow blocks and flanged cartridges made by Boston Gear are available in shaft diameters from ½ to 1¼ in. A feature of the units is a labyrinth seal, known as the Safety-Vent-Seal, which automatically provides the correct amount of lubricant, excess grease being permitted to escape under pressure. The lubricant is sealed in—dirt and dust sealed out.

The chrome-alloy ball bearing used in the supports has a spherically ground outside diameter to permit the bearing to align itself in the one-piece housing. This is claimed to make for accurate shaft alignment and quick mounting. The bearing is supported around its entire circumference.

Boston Gear Works, 60 Hayward St., Quincy 71, Mass.

(MORE DATA? CIRCLE FYI 57, p. 193)

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For details on an advertised product, write the page number in one of the boxes provided, adding the advertiser's initials if more than one advertisement appears on the page – if the page is unnumbered, as a cover or insert, or the ad shows several products, use initials and write in the product name. Fill in your name, title and address, cut out the card, add a 3-cent stamp and mail. We do the rest, saving you time, trouble and money.

NEW BULLETINS

MACHINES AND ATTACHMENTS

1 FORM DRESSER—*Airborne Accessories Corp., Hillside 5, N. J.* 8-page bulletin 201 gives details on a dresser that forms wheels directly from a template without magnified master and that compensates for variations in diamond form or dimensions.

2 SPINDLE EXTENSIONS — *Scully-Jones and Co., Chicago 8, Ill.* 2-page booklet illustrates and describes adjustable adapters and spindle-extension assemblies. Includes drawings, specifications, and a price list.

3 RADIAL DRILLS — *The Carlton Machine Tool Co., Cincinnati 32, Ohio.* 4-page folder gives features of the drill, including power-operated mechanical clamping of arm, head, and column and centralized controls.

4 VERTICAL GRINDERS — *Pratt & Whitney, Div. Niles-Bement-Pond Co., W. Hartford 1, Conn.* 4-page bulletin covers the features of 4in and surface grinders of 16x24 and 24x42 in. class.

5 BROACHING—*The Oilgear Co., Milwaukee 1, Wis.* 4-page bulletin 10001 contains specifications and information on a standard line of Field Power broaching machines and presses.

6 END FINISHING—*Pines Engineering Co., Inc., Aurora, Ill.* 4-page bulletin illustrates and describes bench-type end-finishing machines. It shows how interchangeable features speed deburring, chamfering, facing, etc.

TOOLS AND ACCESSORIES

7 PUNCHES & DIES—*Pratt & Whitney, Div. Niles-Bement-Pond Co., W.*

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Hartford 1, Conn. 16-page manual lists and describes junction and receptacle, disc, and miscellaneous hook such as 3-Way, taper pins, a ratchet drill, etc.

8 PORTABLE DRILLS — *Mall Tool Co., Chicago 18, Ill.* 36-page booklet describes portable electric drills, their uses, and how and where to use them. Tables and charts show proper speeds and drill sizes.

9 DEEP-HOLE DRILLING — *Cincinnati Tool & Cutter Co., Detroit 2, Mich.* 4-page brochure illustrates and describes the methods, tools, machines, and workpieces involved in deep-hole drilling and boring. The company provides the tools and methods or does the job on contract.

10 BANDSAW ACCESSORIES—*Carter Products Co., Grand Rapids, Mich.* 16-page catalog section gives details and specifications on bandsaw guides, tires, wheels, etc.

11 CIRCULAR FORM TOOLS — *Marquard Tools, Inc., Rochester 11, N. Y.* 4-page cost-estimate chart on circular-form tools for automatic screw machines.

12 GREASE FITTINGS — *Universal Lubricating Systems, Inc., Oakmont, Pa.* 14-page catalog gives details on fittings for many applications. Includes specifications and photos.

13 REAMERS—*Pratt & Whitney Div. Niles-Bement-Pond Co., W. Hartford 1, Conn.* 8-page bulletin illustrates and describes HSS and carbide-tipped Camlock reamers. The blades are adjustable and serrated.

HEAT-TREATING AND WELDING

14 STUD WELDING — *Nelson Stud Welding Div., Morton Gregory Corp., Lorain, Ohio.* 4-page bulletin gives specifications and performance characteristics of two power units for stud welding.

15 GEAR HARDENING — *Westinghouse Electric Corp., Pittsburgh 30, Pa.* Booklet gives operational data on the industrial, a radio-frequency gear-hardening machine. Includes specifications.

16 WELDING ALLOYS — *All-State Welding Alloys Co., Inc., White Plains, N. Y.* 4-page folder gives purchasing data on welding, brazing, annealing, and tinning alloys and fluxes.

PLANT-SERVICE EQUIPMENT

17 CONVEYORS—*Link-Belt Co., Chicago 9, Ill.* 48-page booklet provides a directory of the company's products. Many pictures show applications of these products.

18 PALLET TRUCKS — *Towmotor Corp., Cleveland 10, Ohio.* 16-page booklet shows details of the Model W electric pallet truck. Engineering features are illustrated by drawings.

19 EYE SAFETY — *American Optical Co., Southbridge, Mass.* Revised issue of this guide lists eye-hazardous occupations and the recommended protection for each.

20 COPYING MACHINE — *Charles Bruning Co., Inc., New York 18, N. Y.* 8-page booklet illustrates and describes the Copyflex, which uses the Diazo process to make positive, contact-print copies.

21 MAGNETIC SEPARATOR — *The Brice Mfg. Co., Erie, Pa.* 4-page bulletin on the Magnetic Hump, designed to remove tramp iron from material conveyed in pneumatic, gravity-flow and Rapid Runs.

22 CONVEYORS — *The Wilkie Co., Philadelphia 19, Pa.* 8-page bulletin illustrates and describes a telescopic conveyor that can be extended from 16 to 30 ft. Photos show shop installations.

PARTS AND MATERIALS

23 VINYL PLASTICS—*Bakelite Co., New York 17, N. Y.* 32-page booklet describes protective and decorative coatings for many kinds of surfaces based on Vinylite resins. It also discusses the various methods of application.

24 FITTINGS AND FLANGES—*Taylor Forge & Pipe Works, Chicago 80, Ill.* Large card gives dimensions on welding fittings and flanges available from the company.

25 COUPLINGS — *The Falk Corp., Milwaukee 8, Wis.* 6-page folder illustrates and describes Steelflex couplings for either single pilot, double-pilot, horizontal, or double-pilot, vertical applications.

26 CARBIDE GRADES—*Adamas Carbide Corp., Harrison, N. J.* Chart gives recommendations as to the proper grade for each application as chip removal, wear, and impact. Chip removal is covered for steel and nonferrous materials from roughing cuts through precision boring.

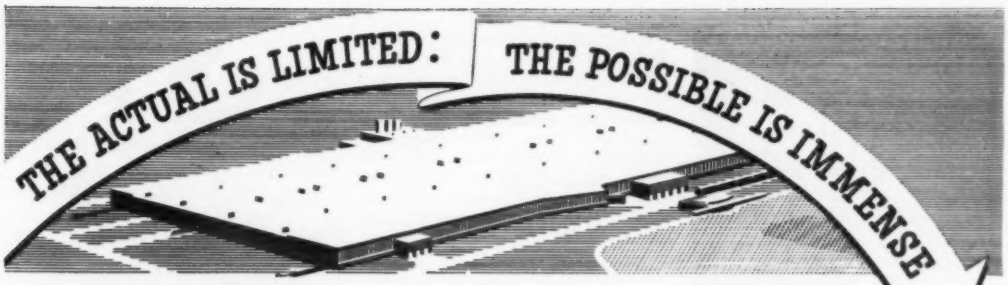
27 FLANGES AND COUPLINGS — *Nestor Corp., St. Louis, Mo.* Slide-rule scooter gives flange sizes on one side and coupling sizes on the other. Includes a pipe-standard table as well.

MISCELLANEOUS

28 PRODUCTION CONTROL — *Remington Rand Inc., New York 10, N. Y.* 56-page booklet shows proper methods of keeping records to avoid bottlenecks. Punched-card methods are shown for all phases of production control.

29 APPRENTICESHIP — *Dept. of Labor, Bureau of Apprenticeship, Washington 25, D. C.* 16-page pamphlet, "Apprenticeship Pays Dividends" outlines ten ways in which following this practice nets worthwhile returns.

30 INVESTMENT CASTING — *Alexander Saunders & Co., New York 17, N. Y.* 16-page booklet goes into all the aspects of precision casting—applications, operating methods, capital, labor, and equipment requirements and future prospects.



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1951

Machine frame designed in welded steel maintains alignment to .005"

Textile machine bed fabricated at The Warner and Swasey Company, Cleveland, Ohio, shows cast steel adapter welded to end of frame.

BY redesigning to a simpler, more economical welded steel construction, this prominent machine tool and textile equipment builder now maintains closer production tolerances while cutting the machining time from 8 hours to 2¼ hours. Alignment accuracy, held within .005" and squareness to within .0015 on the 120 inch frame members shown, is maintained with only one roughing and one finishing cut.

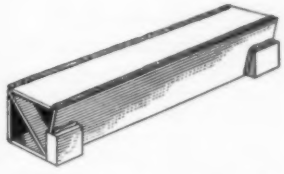
Originally the frame was fabricated from sheared plate using continuous corner welds. The present, simplified design incorporates steel tubing and four angles to which steel castings are welded at each end for subsequent assembly on side frame members.

In addition to saving 170 pounds of metal on each frame, welding time has been cut in half and stress relieving eliminated.

Welding engineers at Lincoln will gladly show you how to design your products in welded steel to improve performance and cut your manufacturing costs. Simply write or call.

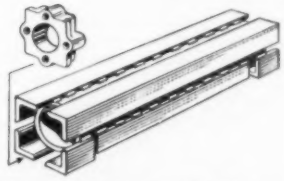
HOW TO DESIGN FOR WELDED STEEL. Latest engineering data, techniques, speeds and costs are presented in the new 9th Edition Procedure Handbook of Arc Welding Design & Practice. Price only $2.00 postpaid in U. S. A.; $2.50 elsewhere.

the ACTUAL



Original Design *of bed frame for textile machine was difficult to machine accurately . . . required stress relieving.*

increasing the YIELD



Present Design *takes 21% less metal . . . 50% less welding . . . eliminates need for stress relieving.*

the IMMENSITY of the POSSIBLE

A 72% REDUCTION in machining time

SEE HOW STEEL DESIGN INCREASES ACCURACY

Machine Design Sheets free on request to designers and engineers. Write on your letterhead to Dept. 103,

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO

Spray Gun Developed for Superheated-Steam, Paint Process

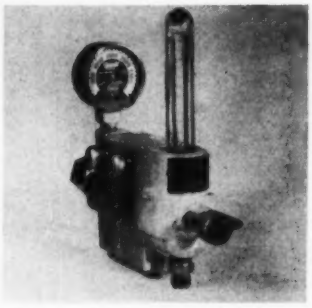
Steam spraying is a process recently developed and patented by E. I. duPont de Nemours. The use of superheated steam as an atomizing agent serves to heat the paint, making it possible to use materials of higher viscosity. Heavier coats are said to be obtained without sagging or running. The difficulties of popping and pinholing, normally caused by entrapped air, are claimed to be reduced. In addition, finishing-material savings of 10 to 20% are claimed through the reduction of overspray and atomization losses.

Equipment needed: A source of steam of not less than 100 psi, spray guns, separators, strainers, traps, regulators, and a superheater. American Brake has a complete line of this equipment.

The S-100 spray gun has radiation and insulation features that dissipate the heat in the gun, enabling the operator to use it with bare hands. Hose supports for steam and material reduce the downward torque on the spray head, making it less tiring for the operator. Other features include a built-in finger guard and an adjustable fluid needle.

American Brake Shoe Co., Kellogg Div., 97 Humboldt St., Rochester 9, N.Y.

(MORE DATA? CIRCLE FYI 61, p. 193)



ARGON GAS is directed through this regulator-flowmeter before being used in shielded-arc welding. It has a 3-stage regulator that maintains constant inlet pressure and accurate flow. The flowmeter, with a finger-tip-controlled valve, permits steady rates up to 60 cfh. The rate is indicated on a float-type tube calibrated in cfh.—*Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.*

(MORE DATA? CIRCLE FYI 62, p. 193)

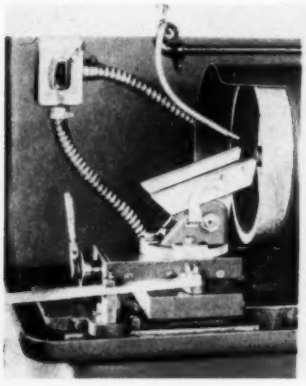
Hauser Measuring Machine Has 3 Scopes, Reads to 0.00005 In.

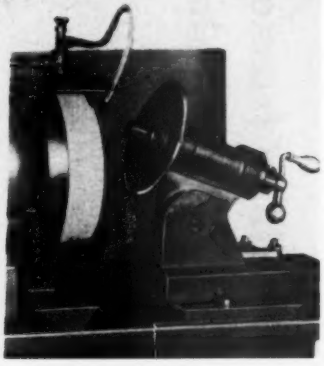
This optical tool is able to read directly to 0.00005 in. without the use of micrometer screws. It will also read measurements in graduations of 1, 0.1, 0.01, 0.001, and 0.0001 in.

There microscopes are used. One reads longitudinal and traverse travel and has a magnification of 100X, another, the measuring microscope, is interchangeable with a protractor eye-piece and has a magnification of 45X. A centering microscope is interchangeable with the graticule for locating center punch marks with bores up to 13/64-in. diameter, and has a magnification of 35X. An episcopic lighting attachment is used for measuring and centering the scopes. A center punch fits concentrically with microscope carrier. Measuring range or travel is 4x4 in.

Hauser Machine Tool Corp., Manhasset, N. Y.

(MORE DATA? CIRCLE FYI 63, p. 193)



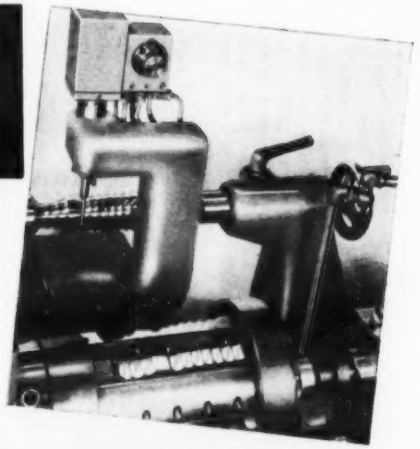


GRINDER serves dual purpose of sharpening both pipe-cut-off blades and thread chasers. The left-hand wheel sharpens chasers for threading up to 8-in. pipe. Repeated sharpenings can be made down to within ½ in. of the end of the chasers. Cut-off blades are sharpened on the right-hand side. The work holder is adjustable for any angle of bevel and true diameter of blade is said to be retained even after repeated sharpenings. The machine is powered by 1½-hp totally enclosed three-phase motor and has a 12-gal.-capacity coolant system. The two cup wheels have a 10-in. dia. *Continental Machine Co., 1952 N. Maud Ave., Chicago 14, ILL.*

(MORE DATA? CIRCLE FYI 64, p. 193)

SAVED! 1 HOUR AND 55 MINUTES PER PIECE IN PRODUCTION TIME—COSTS

SIDNEY FLUID TRACER TIME ONLY 10 MINUTES



From round or flat templates or regular lathe work without limiting range.

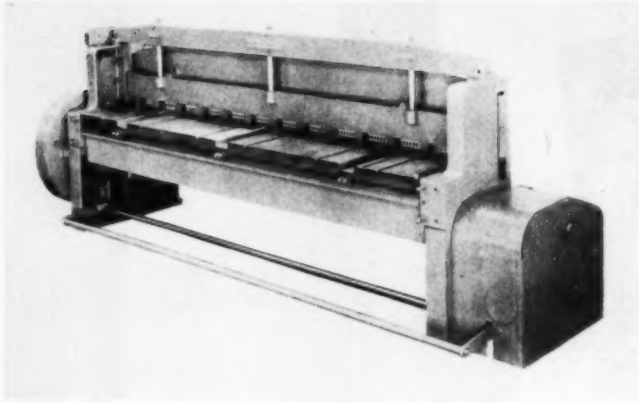
RUGGED... Built to take continuous intermittent cutting with amazing savings on pieces as illustrated.

Get the "inside story"—write direct or contact nearest SIDNEY representative.

SIDNEY HEAVY-DUTY LATHES

SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO

BUILDERS OF PRECISION MACHINERY SINCE 1904



Wysong and Miles Power Shears Have Back-Gage Adjustable to 1/128 In.

Line of squaring shears rated at 12-gage mild steel, and 16-gage stainless steel come in 52-in., 6-, 8-, and 10-ft. cutting lengths. The 12-gage rating is tested on 10-gage sheets, cutting at full length at 60 strokes per min.

Bed, end-frames, holddown and knife-bar are one-piece castings, said to contain more than 30% steel. Standard equipment includes motors with control and electric accessories. The back-gage is ball-bearing mounted and is adjustable to 1/128 of an inch. Front gage and brackets are also included. Motor is separately mounted.

Wysong and Miles Co., Greensboro, N. C.

(MORE DATA? CIRCLE FYI 66, p. 193)

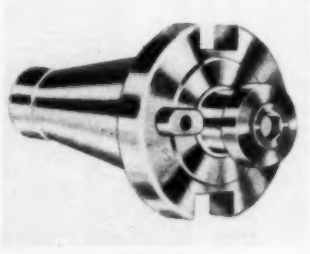
of thickness from ⅛ to 1½ in. The weld can be applied on butt, lap, fillet, edge, and corner joints in overhead, vertical, and flat positions.

Rod feed, argon flow, and cooling water are automatically controlled. An electronic governor provides accurate and uniform control of the rate of rod feed which varies from 80 to 380 ipm. Light-weight construction and the flexibility of the hose and cable makes the unit portable and easily handled.

Argon arc welding has been performed on metal thickness from 1/16 to ¾ in. in aluminum and copper alloys, stainless steel, and similar metals.

Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

(MORE DATA? CIRCLE FYI 67, p. 193)



Nelco Shell-Mill Arbor Adaptable to Side Mills

This Type-C arbor does not require a special wrench, since all sizes are equipped with socket-head standard lock screws. It can be used on all milling machines and cutter grinders, having National-Standard spindle tapers.

Available in ½- to 2-in. dia, the arbor is made from chrome-molybdenum steel, and is precision ground and heat-treated. Removable keys make it possible to install a side milling cutter, thus making the tool more versatile.

Nelco Tool Co., Manchester, Conn.

(MORE DATA? CIRCLE FYI 65, p. 193)

Hand Torch, Automatic Wire Drive For Argon-Gas Arc Welding

A hand torch and automatic wire drive for argon metal arc welding has been developed by Linde. The consumable electrode serves as the filler metal. Welding rod is fed from the coil into the protected atmosphere at a steady pre-determined rate.

Unit is said to be particulary usefule for welding aluminum in ranges

Feed Rate Easily Regulated On Trico Gravity Oilers

A larger capacity makes these oilers applicable for large stationary bearings, journals, conveyor drive chains, etc.; or where it is desirable to extend the refilling time. The Pyrex-glass or Lucite-plastic reservoirs have capacities of 10 oz., 1 pt., 1 qt, and 2½ qt.

Rate of feed is obtained by adjusting a needle-valve control. When the shutoff lever on top of the oiler is in the upright position, the oil feeds at the set rate. When the lever is flipped to the side, the feed stops. Held at a 45° angle, it flushes the bearing, said to be a desirable feature when the machine hasn't been running for some time.

Standard threads provide for mounting right on the bearing, locknut for tightening to mounting bracket, or compression fitting for connecting to tubing.

Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.

(MORE DATA? CIRCLE FYI 68, p. 193)

Hjalmar Ellstrom

INVENTOR OF THE GAGE BLOCK

The achievement of perfection . . . the complete mastery of any art or craft or science . . . is a rare human accomplishment. A discovery or an invention that contributes to the progress and total welfare of all mankind is rarely the heritage left by a single man. So rare is it, indeed, that in such infrequent instances, the true facts surrounding its origin are often distorted, obscured, or even lost in the conflicting claims of others who would seek the personal worldly gains to be derived from undeserved fame.

So it was with the Gage Block. For, actually, this basic standard of measurement now used the world around was originally conceived, developed, and invented solely and entirely by . . . Hjalmar Ellstrom.

Here, briefly, is the story of his accomplishment: During the early 1890's, Hjalmar Ellstrom was employed by the government rifle factory at Eskilstuna, Sweden. He was a master craftsman . . . a man of infinite patience who took great pride in his work. He was a man of vision, too, who recognized the limitations imposed upon industry by the lack of sufficiently accurate measuring devices. So, with a then unheard of standard of precision as his ultimate goal, he alone developed and perfected his checking instruments and techniques . . . then alone he created the world's first gage block accurate to the infinitesimal millionth part of an inch.

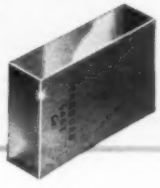
Today, though his achievement has been copied and imitated by others, his personal unqualified devotion to accuracy is the exclusive heritage of Ellstrom.

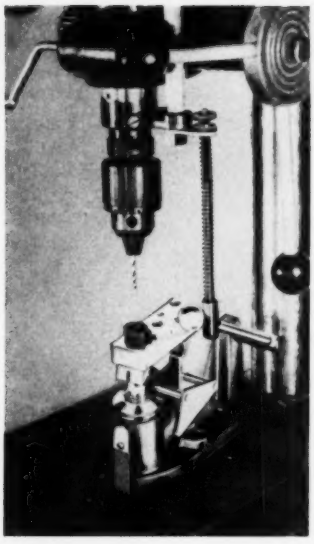
ELLSTROM . . . *measuring in millionths for three generations*

DEARBORN GAGE COMPANY

22035 BEECH STREET • DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks





Simplified Drill Jig Reduces Setup Time

The improved Model X750 Kam-Grip drill jig is said to reduce setup time and provide greater accuracy.

Only one bushing plate is required for bushings up to 11/32-in. drill size, replacing the two plates on the former model. Also, only one double-end anvil is required for work diameters from ⅛ to ¾ in., in place of the two formerly used.

The jig can be operated manually, or automatically when actuated by the drillpress spindle. A lock-release rod for such automatic operation is furnished with the jig.

Manufacturers Engineering Service, Security Bldg., Toledo, Ohio
(MORE DATA? CIRCLE FYI 69, p. 193)

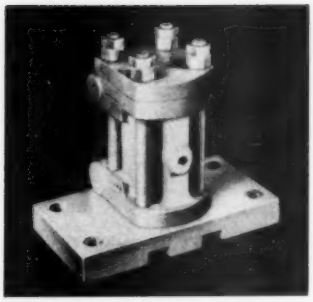
Esso Table-Way Lubricant Passes Stick-Slip Test

Febis K-53 has been developed as a special lubricant for machine-tool ways. Because the table is sometimes required to travel at very slow speeds, it is claimed that it is impossible for the lubricant to build up a complete fluid film between the working surfaces. This is said to induce chatter—reduce accuracy.

Cincinnati Milling requires a lubricant to pass a "Stick-Slip Test" to avoid this difficulty. To pass the test, a lubricant must have a coefficient of static friction lower than the coefficient of kinetic friction. In other words, less force must be required to start one surface moving in relation to the other than is necessary to maintain movement. The K-53 lubricant is said to pass this test.

Its viscosity, SSU, is 333 at 100 F, and 53 at 210 F.

Esso Standard Oil Co., 15 W. 51st St., New York 19, N. Y.
(MORE DATA? CIRCLE FYI 70, p. 193)

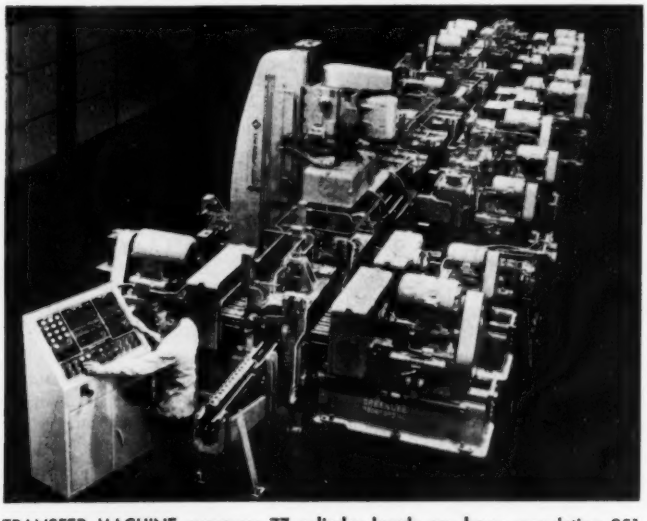


Bin and Hopper Vibrator Is the Quiet Type

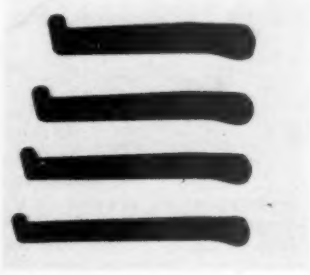
Designed for use on bins, hoppers, chutes, and shake-outs, the style EM vibrator employs heavier pistons and longer strokes without breakage. They normally can be used on heavy-duty vibrators. There is said to be no impact of the piston on either end, no metal-to-metal pounding, and consequently no ear-splitting noise.

Breakage of bolts and end plates is said to be eliminated, cutting repair and maintenance costs. The unit is furnished in 1⅝- to 4-in. sizes and is interchangeable with any bolted vibrator.

Cannon Vibrator Co., 1108 Power Ave., Cleveland 14, Ohio
(MORE DATA? CIRCLE FYI 72, p. 193)



TRANSFER MACHINE processes 77 cylinder heads per hour; completing 251 operations on the top, bottom, manifold side, and ends. It is 66-ft long, and has 15 stations. Turnover fixtures which rotate the work 360° are installed in the 4th and 7th stations to remove accumulated chips from the workpiece. ***—Greenlee Bros & Co., Rockford, Ill.*** (MORE DATA? CIRCLE FYI 71, p. 193)



Reid Trigger Die Stops Are Unhardened for Machining

Standardized line of trigger stops for progressive dies are being made of unhardened, black-finished steel. The finger end is forged flat. They can be readily drilled for installation in the die. The use of these stops saves time over making them singly and is said to improve product appearance.

The stops are available in 3½-, 4-, 4½-, and 5-in. lengths. The body is 5/16 in. square; the stop end has a 5/32-in. radius and ⅝ in. long.

Reid Tool Supply Co., 709 Baker St., Muskegon Hts., Mich.
(MORE DATA? CIRCLE FYI 73, p. 193)

TITANIUM WELDING

Top to bottom: parent metal; weld zone after welding; weld zone after heating 10 minutes at 1650°F. and furnace cooling; and weld zone after heat treatment for 20 minutes at 1650-1700°F. and furnace cooling.

Experimental weld on ½-inch round rod.

Federal Welders of Standard Design Used With Exceptional Success . . .

Commercially pure titanium is being flash butt welded in production quantities by the American Welding & Mfg. Co., using a standard 750 kva Federal Welder.

Titanium rings for jet aircraft engines are formed from 1x1¼-inch bar stock, then welded, using a burnoff of about ¾-inch and an upset of ¾-inch in a typical 15-second cycle.

While experimenting with welding ½-inch round rods of titanium, American Welding found the standard Federal Welder rapidly produced a weld that held under a breakdown tensile of 115,000 psi, the fracture occurring in the parent metal. All ½" test welds were proof loaded at 22,000 pds or 105,000 psi with no failures.

Many such reports of the extreme flexibility and rugged construction of hundreds of Federal Welders working in the first line of defense is the reason why today, more than ever before — *FEDERAL IS FIRST IN RESISTANCE WELDING.*

Federal® WELDERS

Warco® PRESSES

THE FEDERAL MACHINE AND WELDER COMPANY

WARREN, OHIO

British Lift Truck Has Tilting Platform

The Newton Hydratruck will take a maximum load of 1120 lb, has a lifting range of 7 in. to 5 ft, and will lift to maximum height in less than 1 min. It has a 6° downward tilt of the platform and a 3° upward tilt. Available for 4 weeks delivery in both electrical power pump and hand pump lift; the power pump using a ¾-hp motor to operate the lifting jack.

Ginsberg Machine Co. Inc., 22½ Fifth Ave., New York 1, N. Y.

(MORE DATA? CIRCLE FYI 74, p. 193)

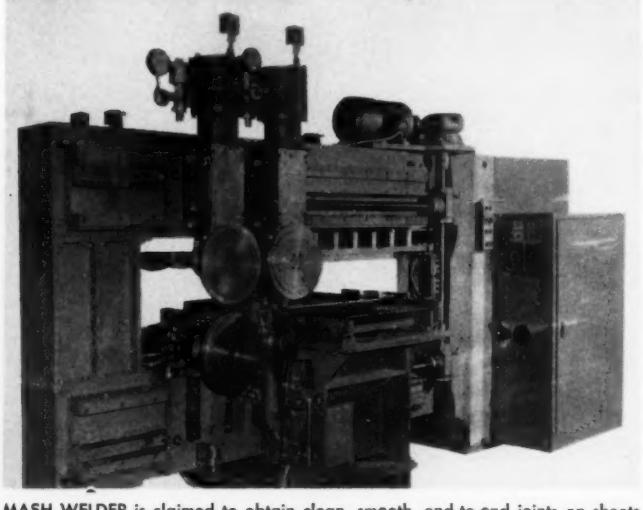
Di-Acro Powershear Employs Variable-Speed Stroke

The Vari-O-Speed Powershear provides continuous shearing within a speed range of 30 to 200 rpm. The necessity of engaging the clutch for each cutting stroke has been eliminated. Speed of the shearing stroke for both continuous and single-cycle operation is controlled with a conveniently located handle.

Another feature is a non-repeating safety clutch, which allows single-stroke operation with the blade moving at any desired speed. The very slow speeds possible are said to provide sensitive action for many delicate and unusual types of materials. A rectangular space built into the front of the cabinet provides knee room for the operator; allowing close inspection of the work.

O'Neil-Irwin Mfg. Co., Lake City, Minn.

(MORE DATA? CIRCLE FYI 76, p. 193)



MASH WELDER is claimed to obtain clean, smooth, end-to-end joints on sheets without protruding metal. In mash welding, the amount of overlap is limited to approximately 1½ times the sheet thickness with pressure increased to almost twice that for seam welding. Known as the PMM2TL, it joins 28-in.-wide mild-steel sheets.—*Sciaky Bros., Inc., Chicago 38* (MORE DATA? CIRCLE FYI 75, p. 193)

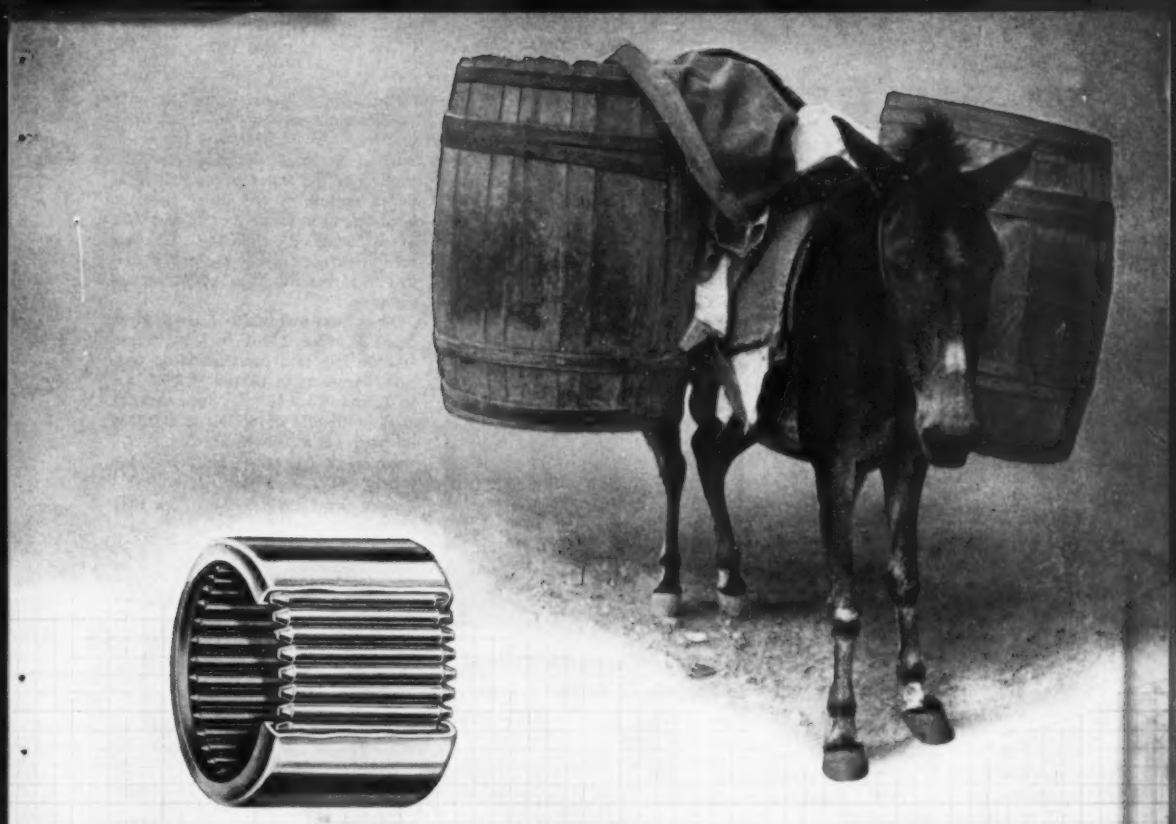
Large Range, Easy Settings Feature Nilco Groove Gage

Gage for checking O rings, internal grooves, and recesses has interchangeable extension arms which give it a large range. Another feature is a bottom plate which provides a positive stop when the unit is in its gaging position.

Range settings are made with a knurled-nut vernier adjustment. Two setscrews that hold the bottom plate are released to allow this plate to travel vertically and then the vernier adjustment can be set within the range of the gage. Settings can be made direct to the gageblock combinations or on a micrometer. A master check-ring gage is recommended for obtaining a constant setting for production runs.

Nilsson Gage Co., Lake St., Poughkeepsie, N. Y.

(MORE DATA? CIRCLE FYI 77, p. 193)



...carries a tremendous load

No other anti-friction bearing of comparable size can equal the radial capacity of Torrington Needle Bearings. A full complement of rollers distributes the load over the largest possible bearing contact surface while holding radial cross-section to a minimum.

Our engineers have solved many high-load, limited space problems with Torrington Needle Bearings. Why not let us help you with your application?

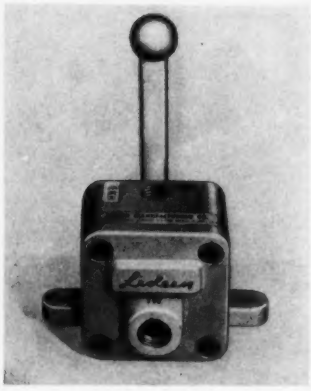
THE TORRINGTON COMPANY

Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON *NEEDLE* BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE ROLLERS



Ledeen Hydraulic-Cylinder Valves Use Rotating Disk

A line of valves for actuating air or hydraulic cylinders are made in three styles: For hand, foot, and finger or solenoid operation. They are available in 14 models for 5 different cycles and in 6 sizes.

The hand-operated valves turn 45° each way from neutral, the foot model 15°. The finger model is actuated by two poppets, which are depressed about ⅛ in. Or, two small solenoids may be used, requiring only momentary energizing.

Ledeen Mfg. Co., 1602 S. San Pedro St., Los Angeles 15, Calif.

(MORE DATA? CIRCLE FYI 78, p. 193)

Proto Universal Sockets Employ a Ball Coupling

Five universal power sockets and a universal joint are used in pneumatic- or electric-power impact wrenches with ½-in.-square drive. They may also be used on adapter-equipped ⅝- and ¾-in. drive wrenches. The sockets have ½, 9/16, ⅝, 11/16, and ¾ in. hexagon openings.

It is claimed that ball sockets operate smoothly at all angles and will not back off the work because force is evenly and constantly applied and there are no dead spots common to block universals. Use of a pin retainer ring permits fast replacement of any part, and eliminates welding of the pin to the socket wall. Only one pin is required.

A friction spring holds the nose end at desired placement position and working angle. The nose end of the socket is tapered or recessed to increase clearance.

Plomb Tool Co., Los Angeles, Calif.

(MORE DATA? CIRCLE FYI 79, p. 193)

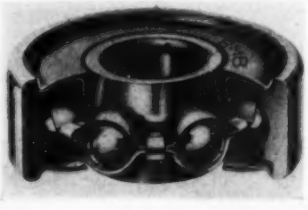
Adjustable Micrometer Claimed To Replace 12 Ordinary Mikes

This V-notch micrometer is available in 12 and 24 in. lengths. The notches are spaced 1 in. apart in a tool-steel blade. A carrier, sliding on the blade and holding a standard 1-in. micrometer head, is positioned in the desired notch and a spring clamp inserted, locking the carrier to the blade. The 1-in. distance between notches is divided into 0.001 in. by the micrometer head. The spring clamp also acts as a safety mechanism should severe pressure be applied to the head.

The gage is so arranged that by adding the micrometer head reading to the V-notch number, the proper reading is taken. Various throat sizes can be supplied.

The Lester Micrometer Co., 3210 Cedar Ave., Cleveland 15, Ohio

(MORE DATA? CIRCLE FYI 80, p. 193)



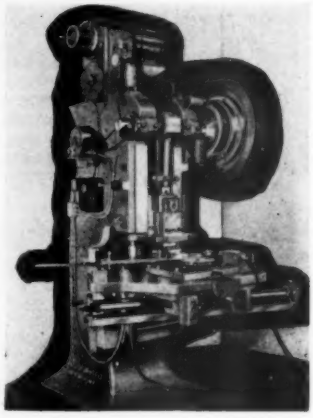
Capillary Seal on Ball Bearings Does Not Contact Rotating Member

Known as the R. F. Series, these bearings are claimed to combine the advantages of a sealed bearing with the freedom of rotation of an open bearing. A capillary chamber is formed by the cylindrical extruded section of the inner cover and a tapered section of the inner race. It is in this area that a permanent film of oil seals the bearing. The external surfaces can be chrome plated to add to the bearings' corrosion resistance.

They are available in four sizes from 3 mm (0.1181 in.) to 8 mm (0.3150 in.) and corresponding outside diameters of 10 mm (0.3934 in.) to 22 mm (0.8661 in.). Two smaller sizes with OD of 0.2362 and 0.3150 in. will be available shortly.

Landis & Gyr, Inc., 10½ Fifth Ave., New York 11, N. Y.

(MORE DATA? CIRCLE FYI 81, p. 193)



V & O Segmental Notching Press Uses Air-Operated Fixture

Rotor or stator segments of the larger sizes, which cannot be handled on the conventional index-ring fixture are notched on this press. Capacity ranges from 24-in.-dia segments to a straight line.

The operator places the blank in position on the fixture and steps on a foot switch. The segment automatically moves into notching position against a stop, which action starts the press operation. At the end of the cycle, a precision switch stops the press and returns the segment to its original position for removal. No index ring is required as the spacing is provided in the die. The press is said to be simple to tool up and maintain for the various number of notches required.

V & O Press Co., Div. Hartford-Empire Co., Hudson, N. Y.

(MORE DATA? CIRCLE FYI 82, p. 193)

LOGAN LATHES FOR PRODUCTION

Production results prove that on both first and second operation work Logan Lathes do the job right and keep the cost down, year after year.

Logan No. 985
11" Quick Change Gear Lathe With 1" Collet Capacity, 1⅛" Spindle Hole, 24" and 36" Center Distances One of the 22 Models of Logan 10" and 11" Swing Lathes

THESE LOGAN CHARACTERISTICS WILL HELP YOUR PRODUCTION

CAPACITY . . .
With 1" collet capacity, 11" swing, 1⅛" spindle hole and center distances of 24" and 36", Logan Lathes have the size to handle substantial work.

ACCURACY . . .
Less than .0005" spindle runout 12" from the bearing . . . two V-ways and two flat ways precision ground to within .0005" variation . . . these are typical Logan Lathe construction tolerances.

VERSATILITY . . .
The Logan Lathe gives you spindle speeds of 45 to 1500 rpm with no bearing adjustment. A complete line of accessories further equips these versatile tools for every type of lathe operation.

RUGGEDNESS . . .
With its ball bearing mounted spindle, its self-lubricating bronze bearings at vital wear points, and its rugged overall construction, the Logan Lathe retains its accuracy and dependability under constant use.

ECONOMY . . .
By reducing power costs; by saving vital floor space; by quick, easy set-ups; by lasting accuracy and low maintenance; Logan Lathes put many metal turning operations on an economical and profitable basis. The saving to be realized on your original investment in Logan Lathes is a further economy well worth considering.

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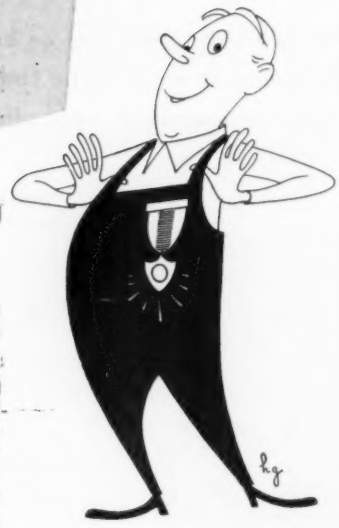
They pinned a medal on "BILL"



That bright suggestion of switching to Simonds Abrasive Company grinding wheels sure paid off for Bill. Output's up and costs are down. The production line is clicking like clockwork and the boss is pleased. Maybe there's an operation in *your* plant that can be done more efficiently and economically by using Simonds wheels, slightly different, but more adaptable to your jobs. Everything in our complete line is accurately specified . . . grinding wheels, mounted wheels and points, segments, abrasive grains. Write for free data book and the name of the Simonds distributor ready to serve you.

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grinding wheels

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA.
DISTRIBUTORS IN ALL PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd. Arvida, Que.

ROUND TABLE Discussion

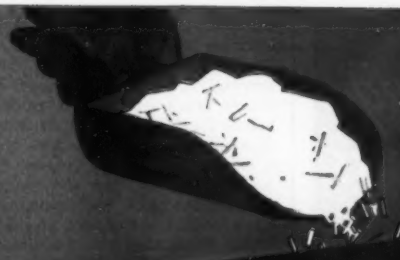
BACK ON THE CLOCK

SHOULD supervision punch the clock, too? Why not? They are employees, and a record of their timekeeping is just as essential as is a record of the men on check. If the supervisory grades were all honest men and women who made faultless timekeeping a point of honor—which, unfortunately, we know is not the case—that, to some minds, would be good reason for exempting them from recording their comings and goings. In effect, it would not be a good reason, at all, in so far that it would amount to making flesh of one and fish of another. Anything today, more especially in industry, which tends to create privilege is to be deplored since it causes resentment and discontent among the other employees who have no choice in the matter.

The habit of good timekeeping greatly helps the morale of a responsible executive and gives him the unquestionable right to demand, without apology, the same quality in others. In this connection, an amusing incident happened recently in the works where the writer is presently employed. The works manager, an excellent timekeeper, was always punctual in coming through the shops at 7:45 each morning. Starting time was 7:30. He held the view that the foremen's presence at 7:30 should be sufficient to ensure a good and punctual start and that if he came in at 7:30 the men might be tempted to feel that the foremen were not entirely trusted by the bosses and that they really did not count.

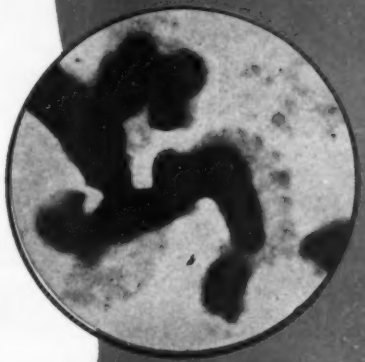
Having occasion to reprove a notoriously bad timekeeper, the man rather surprised him by drawing his attention to the fact that he, the manager, did not show up till 15 minutes after the official starting time. With commendable resourcefulness, the manager in confidential tone contritely assured the grouser that he had not thought his absence from the shops was so keenly felt by the men but, since he really was an early riser, he would, in future, make a point of being on the floor at the sound of the first buzzer. The smart guy was highly unpopular with his work-mates and foremen, thereafter.

During the first World War, the writer was employed with a Vickers-Armstrong concern. The works was



scoop for blitzing bacteria – DOWICIDES!

Bacteria Extracted from Soluble Oils



When you use Dowicides to "blitz" bacteria and [illegible] of cutting oils and coolants, you'll [illegible] down-time and material wastes that result when soluble oils go "sour."

Monday morning odor, emulsion breakdown, discoloration and oil separation—all these are signs that bacteria and mold are growing in the emulsion. And the results of such growths: rusted parts and machines, clogged pipes and drains, together with the extra man hours required to correct the condition, are costly indeed.

You can insure yourself against these added production expenses and gain greater service life from soluble oil emulsions by the incorporation of Dowicides. Dowicides are easy to use and are available in oil and water-soluble types.

If you are not already profiting from their use, investigate this profitable means of bringing microbial control into your plant today.

Dow maintains complete laboratory facilities to help you solve your problem. Contact our nearest sales office or write direct to Midland for additional information on Dowicides.

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New Method of Lapping

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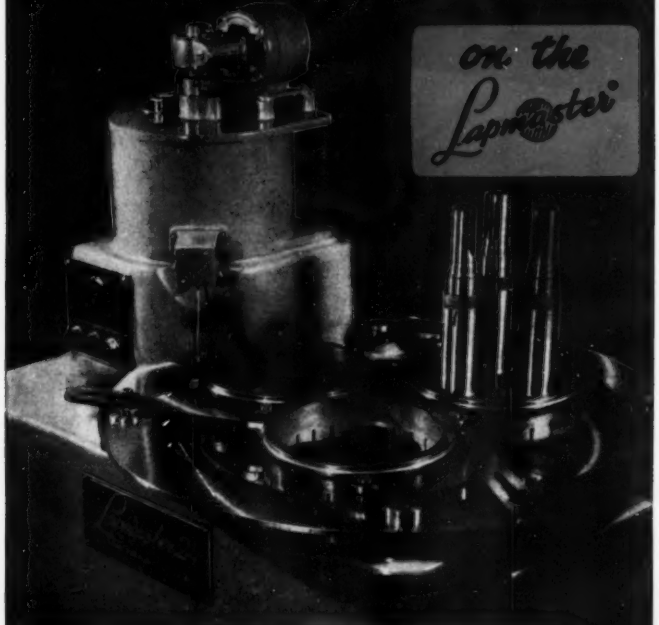
in One Operation



The manufacturer of the parts being lapped on this Lapmaster 24 had the problem of lapping both sides of a brass valve and the mating face of a 15" long hardened steel valve shaft. Finish had to be 2 to 3 RMS and flatness was one light band (11.6 millionth).

The job was simple with a Lapmaster. The great accessibility of this machine permitted the shaft ends to be lapped inside one conditioning ring, while the other two conditioning rings held the valves. Those valves inside one ring were lapped on the first side; the other ring held the ones being lapped on the second side.

Every day, the Lapmaster is accomplishing production lapping never before thought possible. It is the only lapping machine on which the lap plate is automatically conditioned during the lapping cycle—and the only one which automatically feeds a properly engineered "wet" compound-vehicle mixture to the lap plate.

If you haven't yet had the opportunity to investigate this remarkable lapping development, it will pay you to send for our 16-page booklet which describes the entire range of machine sizes with lap plates from 12" to 72".

CRANE PACKING COMPANY

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situated in England and the general manager was a Scot who had seen much service in USA and abroad generally. He was what we over here would call a glutton for work—in before the shop starting time and last man out. Everyone in the factory had a clock number. The general manager was number one and everyone punched the clock. Neither before or since has the writer been in a works where there was less discontent or better timekeeping. The old man was a regular terror but no one really feared him. He made startling demands on all concerned and none failed him. He was respected by all and liked by most and the results he achieved were excellent proof of the soundness of the theory of management by example.

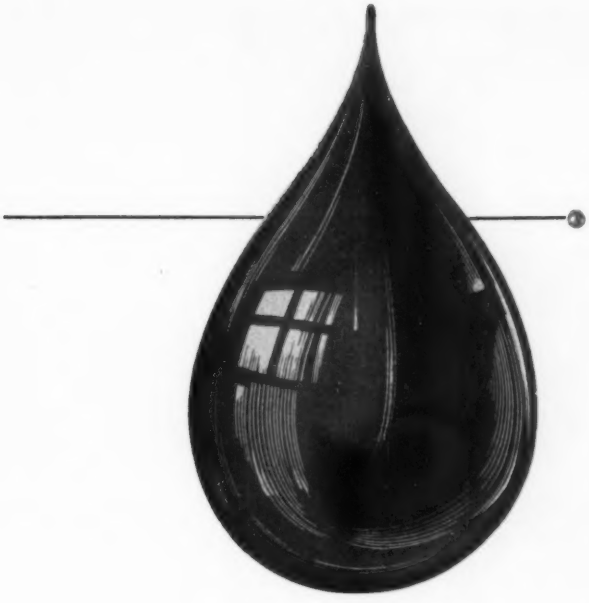
Punching the clock is not regimentation and needs no apology. The apologists should be those members of the staff who sneak in the various back ways or side doors, conscious of the fact that, literally, they are putting their hand into the company's pocket. The good timekeeper always uses the front door. As an executive of more years standing than I care to be reminded of and as one who has always been particular in the matter of timekeeping I have always held that there should be no exceptions among employees in the matter of conduct, however highly or lowly placed.

I really think that the higher up in the councils of a company a person may be, the more particular should that person be not to break a contract made and always faithfully to observe the rules. Managers and foremen should regard it as part of their job to set a good example, which, indeed it is and no amount of blarney on the part of habitual late comers or their apologists can alter or disprove that.

C. D. Mackinnon
Airdrie, Lanarkshire, Scotland

•

DOES THE title not tend to put the question into a wrong perspective; to give the use of the clock a kind of slur. In a well-ordered works, should not all members of the personnel record their time—be on the clock. If not, how is it to be known if the Eds, the Als and the hourly rated men are there, and when they arrived. This seems even more necessary when a man of the Al grade, a brass hat, openly declares his contempt for law, order, and honesty, and says he has got someone to punch his card before and can "get plenty of pals" to do it again. And these



Why a *treated* hydraulic oil has a longer useful life

It isn't what you pay per gallon that determines the true cost of a hydraulic oil. That depends on how long you can safely use it.

All petroleum products will eventually oxidize and form gums and sludges, even if they have been scientifically fortified by additive treatment.

But such treatment will measurably extend the oil's useful service life. There is a saturation point, beyond which gums tend to "plate out" or be deposited in the system—on pump vanes, rotor shafts, valves, etc. Chattering and inaccurate indexing will result.

A good oil, treated the Houghton way, will have additional service life because its gum solvency property enables it to carry two to three times as much gum in solution, as compared to an untreated oil, without plating out.

First, we treat HYDRO-DRIVE Hydraulic Oil for greater oxidation stability. That, in itself, lengthens the oil's life. But further, when the time finally comes that even an oxidation-inhibited oil will be affected by severe service conditions, then the oil which has also been gum-solvent treated will still be O.K. for further use.

Add to this a rust inhibitor, and give that three-way treatment to a high-V. I. oil, and you have HYDRO-DRIVE—an oil that costs little more originally, yet has two to three times the service life of ordinary straight-run oils.

Part of the proof is shown in a technical booklet available. But the best proof is in the using, in actual production. Try Hydro-Drive, and you'll see what we mean. Or write for bulletin and prices, to E. F. Houghton & Co., Philadelphia 33, Pa.

TO CLEAN UP MACHINES—

Use Houghton's GUM SOLVENT "B", added to your hydraulic system while in operation. No lost time. Write for descriptive folder.

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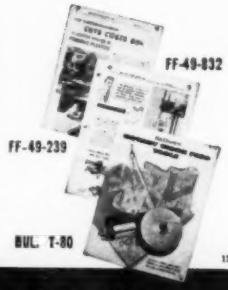
Ready to give you on-the-job service.

Dial feeding parts with the Bellows Rotary Work Feed Table gives up to 25% or more production; (gains up to 100% are not unusual from users' reports.) Even inexperienced operators get this added production because *safe* dial feeding takes away the fear that unconsciously causes an operator to slow up.

With the air-powered Bellows Rotary Feed Table on the job, the operator loads at one station, unloads at another, while work goes on at a third station. (Standard tables will position 4, 6, 8, 12 or 24 stations.) Table and ram are electrically or mechanically synchronized. The Rotary Feed Table sets the production pace, and maintains it uniformly all day long. The operator rhythmically loads and unloads. Production soars.

FOR FULL DETAILS

For full details how you can apply safe, "Controlled-Air-Power" feeding of parts to press rams to obtain up to 25% or more greater production, write for your free copy of Bulletin T-80, and the dial feeding Foto Facts File (installation photographs, wiring diagrams, etc.). Address: The Bellows Co., Department AM-351, Akron 9, Ohio.



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The Bellows Co.
AKRON 9, OHIO
FASTER, SAFER, BETTER PRODUCTION — WITH "CONTROLLED-AIR-POWER"

"pals" respect Al's seniority; surely a non-existent item.

Al would seem to think that seniority is a matter only of grade but he is mistaken; it is a matter largely of character, a quality with which he would appear not to be acquainted. If only Al could look at himself through the wrong end of a telescope, what a pigmy he would see and yet the poor man would appear to be suffering from that painful complaint, cranial elephantiasis. Poor, poor Al and also, the poor, very poor judgment of the firm which selected him.

The clock should be the recognized medium for recording time, from which there need be no exception. The presence of the staff men, and also of the hourly rated men, would be shown, the clock cards for the latter providing a personal record as a basis for their wages. If a staff man be down-graded and he be put on the hourly basis again, this would merely mean a change of clock. The idea that, as a foreman, Al should be asked to line up with the men he supervises, and use the same clock, would be bad psychology and is probably only a figment of Al's disordered mind; the suggestion that he should not use the clock at all is just Pecksniffian and evidence of the cranial complaint referred to earlier. Alas, poor Al.

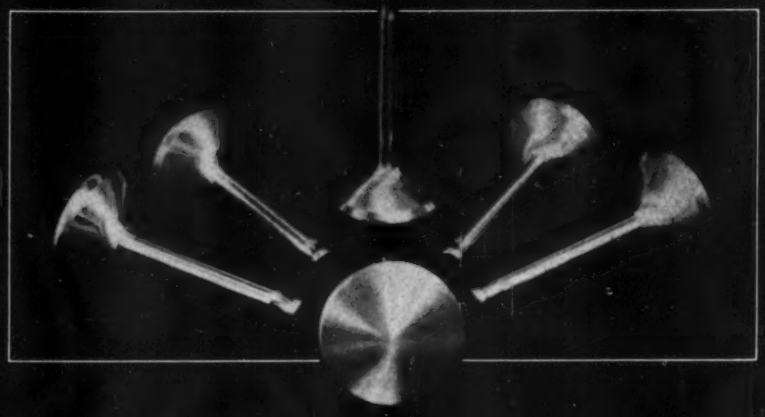
P. E. James
Lindum, England

PACK RATS

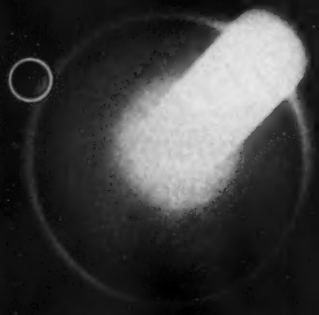
So AL is in a quandary because Harris lost a ten-inch hunk of yellow brass and Thomas lost a piece of flat stock and he's trying to figure out a way to search the whole shebang every night. Take it easy Al or you'll work yourself into a nervous breakdown. Of course things will disappear mysteriously; they always have and always will so long as human beings are like they are.

This 20th century pack rat, as he could be appropriately termed, is the same kind of homo-sapiens as he who passes the little wicker basket around on Sunday mornings. Were the basket carrier's conscience the same as the material toter he could materially augment his holdings with financial reinforcements.

Why should one load up his lunch box, or wear the lining of his pockets, with a collection of metallic valuables and the other treat as inviolate the jingle of coins dropped in the basket? If the plate passer were to dip into the other fellow's shekels with the same conscienceless facility as does the stock appropriator we



When minimum specs hit tops...



RADIOGRAPHY helps meet them

Newest developments in piston aircraft engines put stern demands on exhaust valves. Specifications have climbed toward perfection. Even a tiny irregularity, chip, fold, or flaw cannot be tolerated.

So the manufacturer radiographs each valve. It is the one way to disclose internal conditions without destroying the part—the one way to release only products of highest quality.

Radiography has become a dependable means of gaining a reputation for constant top-quality work. It forestalls imperfect products—frequently suggests changes in operations that assure higher yields in production runs.

Ask your x-ray dealer to show you how radiography can increase your production and improve quality. Send for a free copy of "Radiography as a Foundry Tool."

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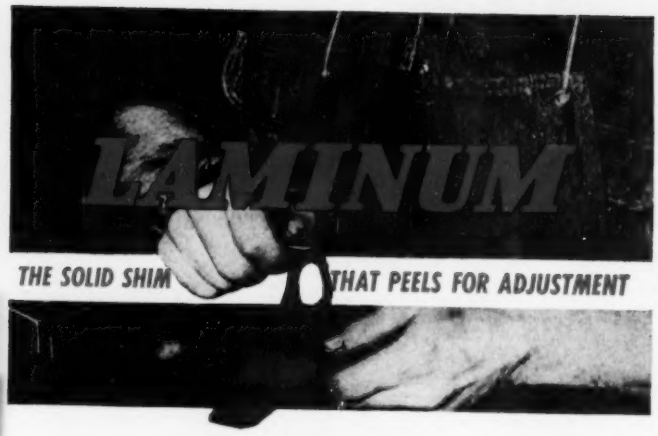

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would immediately brand him as a dirty crook. The appropriation of valuable pieces of stock, unfortunately practiced by some, is, for some unknown reason, treated as common practice and in a way condoned. Al, why should this be? What is the difference in viewpoint?

Can it be that this pack-ratting practice is getting worse because of the devaluation of the dollar? Can one come to the conclusion that men have grown gimme conscious and feel that they are entitled to all they can get at somebody else's expense? Al must face the bewildering problem with intrepid stamina and try to get to the bottom of it in spite of its damaging consequences, or, perchance, he might save himself some loss of refreshing sleep by giving up in futile disgust. Maybe the poor chap can add ten years to his life by throwing his feet up on his desk and exclaiming with defeated resignation: "Ah, I think I'll get me a little South Bend, too, and make up a lot of little doodads." Al, you might as well stick your healthiest finger in the dike and let it soak until the soul of man rises to the position of sublime trust in himself and his fellow man. It can be done, but, oh man! what a job to make him over again!

Jack Everett
San Francisco

•

No MATTER how many guards are placed around a plant, no matter how many forms are required to be filled out, and no matter how close the supervisors watch the men, pieces of material, tools and other company property will walk away.

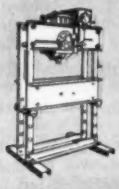
Many men have beaten their heads against the wall trying to figure out a way to eliminate the disappearance of these articles, and many more will still mess up the walls with their brains.

There are many methods used by employees to carry material out of the plant, ranging from just sticking the article in his pocket to stuffing it behind a bra. Lunch boxes with false bottoms or dummy thermos bottles can be used to get by the guards.

Pilfering cannot be eliminated, but the loss can be kept to a minimum by various methods. The system to be used should be determined by the cost of maintaining it. That is, it would not be economical to spend $5000 a year to prevent $100 worth of material from being stolen.

The use of guards will prevent, to a certain degree, the disappearance of bulky articles. This system is

Unusual machines for a wide variety of industrial applications



1. 150-Ton Electdraulic Press

Motor driven heavy duty hyraulic press; pre-set controlled tonnage; ram speed 12" down, 13" up per minute; ram travel 12"; bolster travel 28"; work can be fed from side or front; one operator can center work and control press.

2. Reamers, Dual Spiral

Dual spiral cutting action, one dual spiral reamer replaces five standard expansion reamers, straight or tapered shanks.

3. Tool Post Grinders

Attachment for lathes, shapers, planers and millers; Applications: internal, external, face and taper grinding.

4. Presses

For every purpose, sizes: 2 ton, 3 ton, 10 ton, 25 ton, 40 ton and 60 ton, hand, hydraulic, air or motor driven.

5. Ball Bearing Die Sets

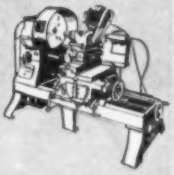
Features ball bearing bushing, long die life, perfect alignment, cleaner cutting.

6. Hypermatic Punch Presses

Revolutionary, reciprocating action, High speed blanking press capable of 1800 strokes per minute.

7. HGX—Grinder—Lathe

Combines work of grinder, lathe and borer; 53" swing; automatic cross feeds! hollow work spindle; face plate; grinds or turns large surfaces, internal and external tapers; small model ACX also available.



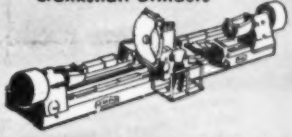
8. Speedmaster ReamORhone

Wet ream and wet hone on one machine, quickly interchangeable from reaming to honing.

9. Mobilcrane

Eliminates need for overhead hoists and rails, capacity up to 2 tons, boom travel to to 6'8" (Boom extension available) Portable.

10. Diesel Engine Crankshaft Grinders



Resizes and reconditions large railroad engine crankshafts up to 224 inches length, 40 inch swing; other models up to 382 inches length 60" swing. Also cylindrical grinding operations. All of the accuracy and features of the smaller world-famous Lempco automobile and truck crankshaft grinders.

11. Surface Grinders

Tilt-table, spring floated disc grinder, with coupled air suction and waterfall grit remover. For flat grinding of castings or other metallic surfaces up to 19" wide. Larger wet grinding fully automatic surface grinders models also available.

Grinds dies up to 62" long

Castings up to 28" deep

Work floats on locating pins or is clamped or chucked into position

Wet Surface Grinder with automatic traverse and positioning work table

Here is a wet surface grinder with a big capacity that would cost many extra dollars if it were built to conventional design. It has multiple uses in toolroom or shop grinding both large and small work pieces with accuracy and speed.

Work is ground at convenient eye level, the grinding wheel traverses automatically between adjustable stop limits. A 14" width can be ground in one setting. A revolving work table enables the operator to grind two or more surfaces successively without removing job from machine. Precision 4-point level is included for squaring up work.

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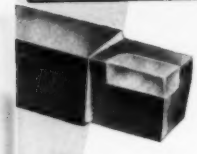
How to CONSERVE Grinding Wheels and Operator Time



Conservation of materials and manpower, always essential, becomes imperative in times of emergency. Marked savings in equipment and labor required for maintenance operations are readily effected by using metal-cutting tools that stay sharp longer. The full significance of this obvious fact is perhaps not fully realized.

Kennametal tools, for example, work more hours per day, spend less time in the grinding room, and thus help sustain machine productivity, make operators more efficient, and reduce inventory. On important jobs they have demonstrated an ability to do up to four times as much machining per unit of carbide consumed.

This superior performance results from a unique coordination of manufacture and an all-inclusive control of properties—from raw materials to finished product.

Kennametal Inc., in its own plant, refines all carbides directly from ores, oxides, and by-products; processes these carbides into Kennametal compositions by means of exclusive methods and patented techniques; and fabricates complete tool and wear-part designs that utilize the distinctively uniform combination of hardness, strength, and wearability inherent in Kennametal. Outstanding among these efficient application developments is the mechanically-held technique, in which we pioneered.

A sure means to prevent waste of man-hours and equipment, therefore, is Kennametal tooling.

For those who wish assistance in developing tool applications that provide maximum cost-saving and productivity through utilizing the unique properties inherent in Kennametal, the Company maintains a corps of competent Field Engineers in all important industrial centers.

Their services are available to you for the asking.

KENNAMETAL *Inc.*, Latrobe, Pa.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY

only efficient if every employee must pass the guard at a certain exit, if the guard is constantly present, and if the guard is loyal, trustworthy, etc.

In some plants the guard is also the watchman. He stands at the door at quitting time only. While he is making his rounds, the door is unprotected. Overtime employees leave at various intervals, unnoticed. In many plants, the guard stands at the main exit, but some employees leave by other exits, and in many instances the guard fills his pockets before leaving the plant, too.

Having the employee sign out for all tools, materials, etc., will control the disappearance of articles, but is not infallible. Plant employees have an unexplainable mania for trying to "beat the system." Invariably, they are not concerned too much in what they get, but how they get it. They will snitch things of no value to them just to prove to themselves that it is possible to outwit the most elaborate procedure.

In a small shop where guards or a checking-out system would be uneconomical, it is up to the foreman to control the amount of material diverted pass the time clock. The best system that I ever came across was very simple. Every time something was missing, the foreman would bellow and raise such a rumpus that an employee would think twice before he appropriated anything again. Once an electric drill disappeared and for two days the foreman harped about it so much, it was "found" to keep peace in the shop.

This problem will always be with us. There is no present solution, but individual methods can be employed to hold losses at a minimum.

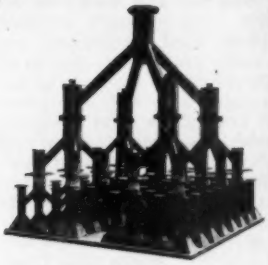
Frank J. Zarnowski
Rutherford, N. J.

•

JOHN SMITH paused before the bulletin board, his eye caught by heavy red type at the top, reading: "Where *Is* the Line, and How DO WE *Hold* It?" Somehow, it arrested his attention sufficiently that he read the balance, as did most of his fellows. It ran like this:

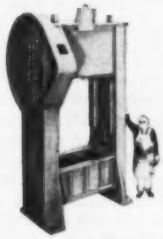
"Frankly, we do not know just where the line is, and we do not know just how to hold it. We certainly would not want to incriminate a man for appropriating something of little or no worth to the company, which nevertheless might have a modicum of value to him. But the consciences of all men are not alike. Theft can reach a stage where it is highly serious. There are men whose conscience would not allow them to

Steel-Weld FABRICATION

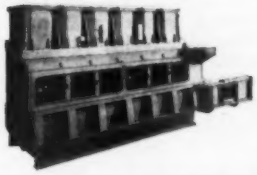


One of Several Parts of a Catalytic Cracking Plant Produced for the Petroleum Industry.

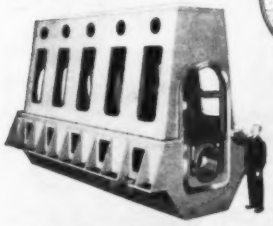
Pressure Vessels for the Chemical and Allied Industries.



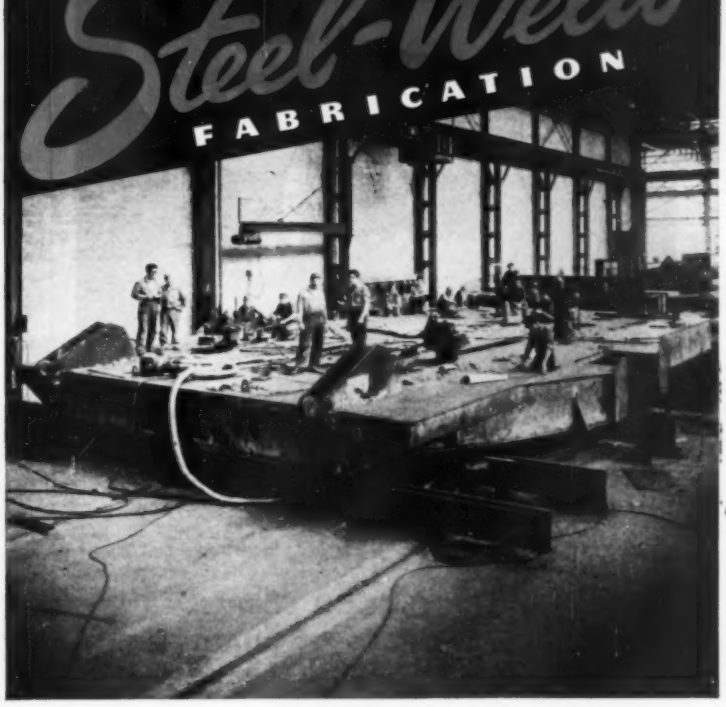
Heavy Press and Machine Frames and Bases for the Machine Tool Industry.



Diesel Engine Crank Cases and Frames for the Marine and Electro-Motive Field.



Crank Cases, Frames, and other Parts for Manufacturers of Marine Steam Engines of Uniflow or Multiple Expansion Type.



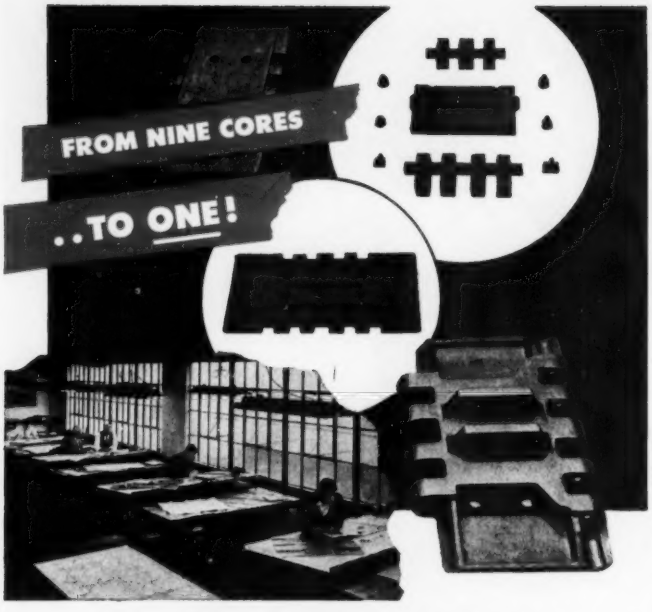
Use WELDED STEEL for Greater Strength with Less Weight!

Illustrated above is a large Steel-Weld Fabricated base for a gigantic earth moving machine. This, and other units illustrated on this page, are typical of thousands of Steel-Weld Fabricated parts and major assemblies produced by Mahon for manufacturers of heavy machinery and equipment throughout the country. If you employ welded steel in any form—or could employ it to advantage in your product—you will find in the Mahon Company an unique source with complete, modern fabricating and machining facilities . . . a source where skillful designing and advanced fabricating technique are supplemented by the art of master craftsmen from whom you may expect a smoother, finer appearing job embodying every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON



UNITCAST ENGINEERING

SAVES ON PRODUCTION COSTS . . IMPROVES QUALITY!

The illustrated steel casting was formerly made from nine hand made cores, resulting not only in slow production but loss of accuracy. So Unitcast Engineering went to work. By replacing the nine hand made cores with one unit blown core, increased production was balanced, quality improved, and all core holes on every casting were in perfect alignment. Here's just one of the many ways Unitcast facilities provide better customer service, improve the product and keep production costs competitive.

UNITCAST
Corporation
QUALITY STEEL CASTINGS

Give us a chance to offer a "cast steel" answer for your parts problem. Our suggestions while your product is in the design stage will pay continuous dividends. Write or call today. Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio. *In Canada:* Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

UNITCASTINGS ARE FOUNDRY ENGINEERED

take a rivet or a screw. There are men who feel that taking an occasional rivet or screw certainly would not break the company, and who feel it would be all right to do so. There are, we are sorry to say, other men who will appropriate small tools, pieces of valuable raw material, or anything of value with which they think they can get away.

"We don't know how you feel about the rivet or the screw. We realize that over 95%, (and probably over 98%) would never compromise their conscience to the point of appropriating small tools or material of relatively high value. But the fact remains that the 2% or the possible 5% will do so, as evidenced by our records that increasing losses are being reported in by various foremen. The fact also remains that relatively few dishonest men place all honest workers under a cloud of suspicion.

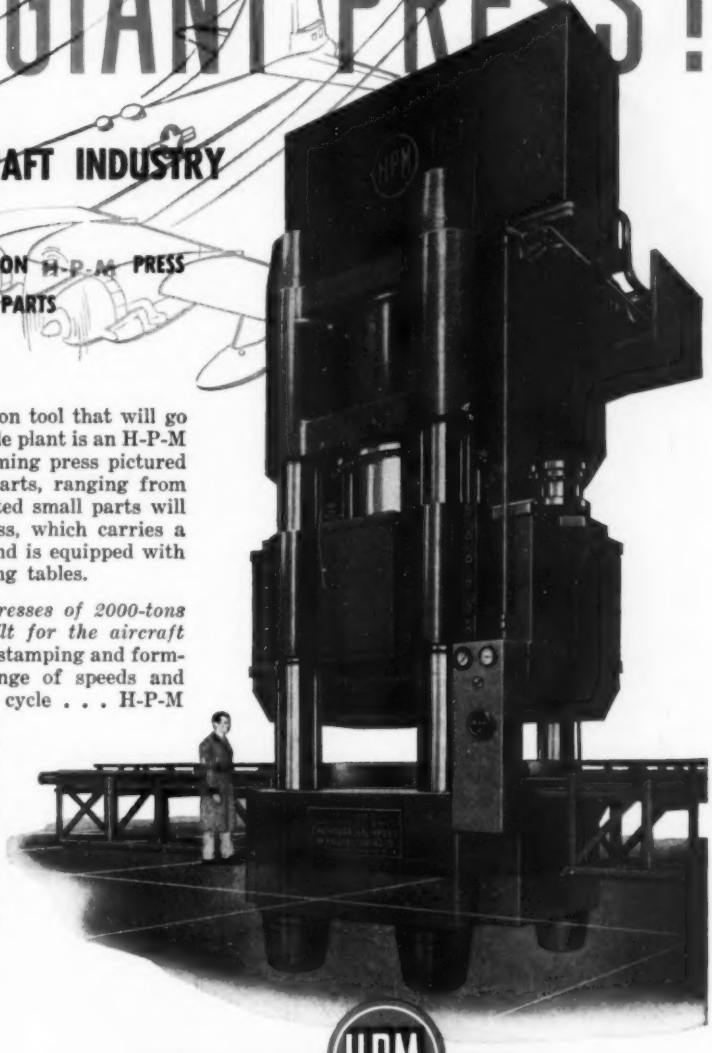
"We need and cherish the good will of every honest employee, and we know that the great majority of our employees are absolutely honest. You will agree with us, however, that something must be done to stem the increasing outflow of lost items which is causing serious loss to the company on one hand, and throwing unfair suspicion on honest employees on the other. We are inaugurating a program under which all of our employees who are willing to do so will be subject to at least cursory examination at different times, upon leaving the plant. None will have their lunch pails or pockets examined who object to doing so. You will not be embarrassed by such an examination being conducted every day, but no one will know in advance on what days nor how often it may occur. Any man found with articles or ma-

"You've got automatic feeding on your punch presses—why don't you figure out the same thing for the baby"

NEW GIANT PRESS!

...FOR THE AIRCRAFT INDUSTRY

BOEING TO PUT 7000-TON H-P-M PRESS TO WORK ON BOMBER PARTS



● The newest production tool that will go to work in Boeing's Seattle plant is an H-P-M 7000-ton rubber pad forming press pictured at the right. Bomber parts, ranging from large bulkheads to assorted small parts will be produced on this press, which carries a rubber pad 48" x 120" and is equipped with hydraulic actuated loading tables.

Thirty-six H-P-M presses of 2000-tons or larger have been built for the aircraft industry for such special stamping and forming jobs. The wide range of speeds and controls . . . automatic cycle . . . H-P-M FASTRAVERSE "closed circuit" hydraulic power system and top operating economies have made H-P-M presses the choice of the entire metal working industry. Find out what H-P-Ms can do for your production problems by calling in an H-P-M engineer today.

Write for a free copy of Bulletin 5005 which describes in full H-P-M FASTRAVERSE press operations and features.

HPM

THE HYDRAULIC PRESS MFG. CO.

1002 MARION ROAD - MT. GILEAD, OHIO, U.S.A.

Makers of Presses for the Metal Working and Processing Industries - Plastic Molding Presses - Die Casting Machines - Hydraulic Pumps, Valves and Power Units

SERVING INDUSTRY THROUGH HYDRAULICS

toughen metal

improve surface

end stock waste

The Torrington Rotary Swaging Machine delivers 4000 hammer blows a minute...reduces, sizes, rounds, points and tapers rod, wire and tubing... work-hardens metal for toughness and resilience... produces a burnished surface... utilizes every bit of stock.

Torrington Swager performance is based on our 42 years of swaging experience. Send the coupon for your free copy of the booklet illustrating the machines and describing the art of rotary swaging.

THE TORRINGTON COMPANY
Swager Department
559 Field Street • Torrington, Conn.

For a free copy of this booklet, send the coupon today.

Please send a copy of "The Torrington Swaging Machine" to:

Name_____

Firm_____

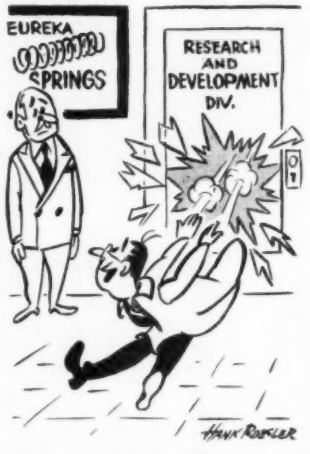
Address_____

terial not belonging to him will be summarily discharged. We feel that all of our employees who are honest will be glad to have such men taken from the payroll.

"But you may want a rivet or a screw, or something which is of little consequence. If so, we say you are welcome to it, if in the judgment of your foreman it really is of little consequence cost-wise. All we ask is that you report it to your foreman, and he will issue you a printed clearance slip to present with it at the gate, if necessary. We certainly want to be reasonable, and we sincerely regret any embarrassment to anyone. The fact is the company is embarrassed over this situation, and we fully expect to discontinue all examinations at the gate as soon as reports on lost materials and tools warrant it, and for as long as such reports may warrant it. We will certainly appreciate your kind cooperation. Remember, you and your lunch pail will not in any case be examined except with your own consent."

John Smith had never really given the matter of shop thievery any particular consideration before. He was a fair-minded man. He resented the idea of being examined for stolen articles, but he saw the justice of the bulletin. As he mulled it over, for some strange reason which he could not quite explain to himself, he arrived at the decision that he would welcome a reasonable examination at any time, for he knew he had nothing to hide, and the bulletin was worded in such a way as to take out the sting.

As John went around the shop for



"Our new X-192 spring is going to wow 'em, . . . after we get a few bugs out of it!"

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at factory prices

Save time and money—assure yourself of uniform quality and parts interchangeability by standardizing on Boston Gear quality products—stocked at these Authorized Boston Gear Distributors — one near you!

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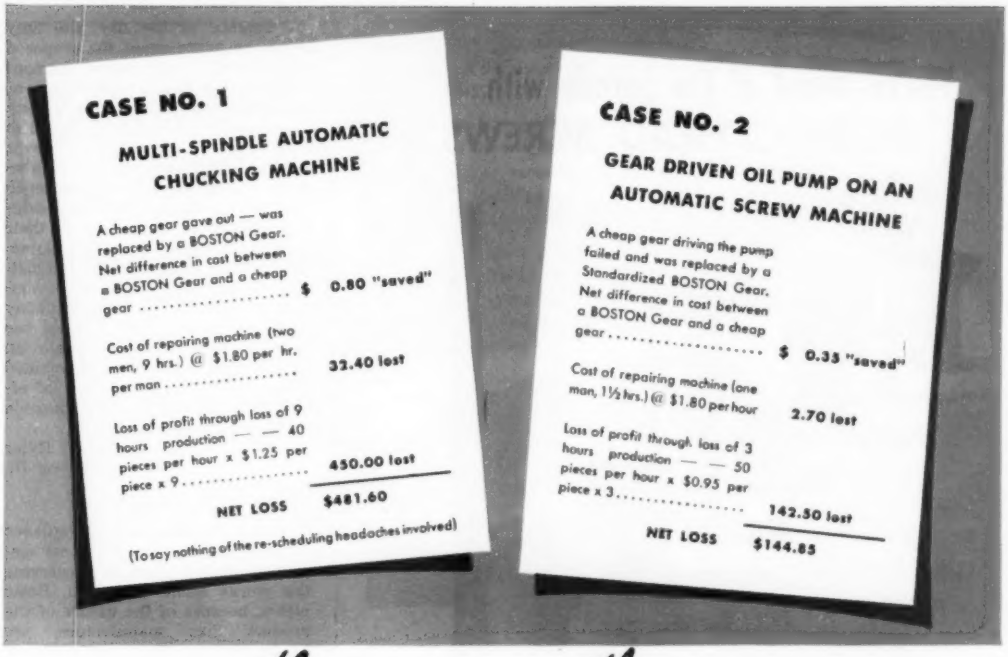
BOSTON Gear STOCKS ARE Near


CASE NO. 1
MULTI-SPINDLE AUTOMATIC CHUCKING MACHINE
A cheap gear gave out — was replaced by a BOSTON Gear. Net difference in cost between a BOSTON Gear and a cheap gear ..... $ 0.80 "saved"
Cost of repairing machine (two men, 9 hrs.) @ $1.80 per hr. per man ..... 32.40 lost
Loss of profit through loss of 9 hours production — — 40 pieces per hour x $1.25 per piece x 9 ..... 450.00 lost
NET LOSS $481.60
(To say nothing of the re-scheduling headaches involved)
CASE NO. 2
GEAR DRIVEN OIL PUMP ON AN AUTOMATIC SCREW MACHINE
A cheap gear driving the pump failed and was replaced by a Standardized BOSTON Gear. Net difference in cost between a BOSTON Gear and a cheap gear ..... $ 0.33 "saved"
Cost of repairing machine (one man, 1½ hrs.) @ $1.80 per hour 2.70 lost
Loss of profit through loss of 3 hours production — — 50 pieces per hour x $0.95 per piece x 3 ..... 142.50 lost
NET LOSS $144.85

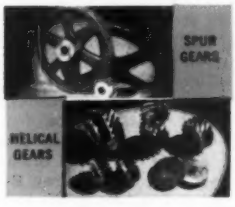
HOW *Cheap* IS A *Cheap* GEAR?

Sure, you can shop around and buy gears for a few cents less than STANDARDIZED *Boston Gears* — gears of known quality and proved performance.

But, stop and think what this "saving" really means. The purchase price of the gear is a tiny fraction of the cost of replacing a gear.

Look at these typical examples. They're not exaggerated. You can think of many like them.

Gears of inferior quality not only wear out faster, requiring more frequent replacement, but they're noisier, waste power, cause frequent bearing replacement...With gears it pays to standardize on the best — in design, material, workmanship, finish, accuracy — *BOSTON Gears.*



SPECIFY STANDARDIZED BOSTON GEARS

DESIGN THEM INTO YOUR EQUIPMENT

GET THEM FROM NEARBY STOCK

(*See list of Authorized Boston Gear Distributors*)

BOSTON GEAR WORKS

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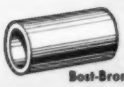
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You're ahead of the parade with
..ALLEN ⬡ HEAD SCREWS
FOR THE LATEST IMPROVEMENTS IN FASTENINGS
LOOK FOR THE BLACK & SILVER STRIPED ALLEN BOX

New manufacturing methods and improved alloys are constantly bettering the quality and uniformity of socket screws, dowel pins and pipe plugs.

Not all the improvements are made first by Allen but a *very large percentage of them are.* Some of the most important have yet to be duplicated even after years of trying.

IF YOU BUY SOCKET SCREWS, DOWEL PINS OR PIPE PLUGS . . .

standardize on genuine Allen products to get more important improvements sooner.

IF YOU ARE DESIGNING OR IMPROVING A PRODUCT . . .

check with Allen directly or through your industrial distributor. Frequently a long search for more satisfactory fastenings ends in the Allen engineering department.

SOLD ONLY THROUGH LEADING DISTRIBUTORS

Write the factory direct for technical information and descriptive literature.

ASK RAYTHEON:

Allen ⬡ Head screws are required to meet the standards of most of the Raytheon products manufactured on Government contracts; hence they are used widely on the equipment made by this prominent manufacturer.

WARNING
Allen-Type screws aren't necessarily Allen-Made.
Get genuine "Pressur-formed" Allen ⬡ Head screws in this black and silver box.

ALLEN ALLEN HEAD
MANUFACTURING COMPANY
Hartford 2, Connecticut, U. S. A.
NEW YORK, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES

the balance of the day, the only gripes he heard about the proposed program came from Harry Simmons and from Jim Barry. Harry Simmons was a man concerning whose honesty a question mark had long lurked in John's mind. Jim Barry, whatever his status with regard to actual honesty, was known to be super-sensitive by everyone who had any dealings with him, so neither of their opinions carried much weight. Somehow, as John Smith thought the matter over more and more, he was completely convinced that the company was not only entirely fair in the matter, but that the program on which they had decided combined the greatest possible degree of efficiency with the smallest possible degree of hurtfulness.

John E. Hyler
Peoria, Ill.

•

CONSTANT and unrelenting vigilance is the only way to keep some employees in any plant from carrying the works home piecemeal. Some plants, because of the nature of the product they manufacture, are harder hit than others. Radio plants, for instance, are heavy losers to the "hams" and souvenir collectors.

No plant or office that I have ever seen, or will see, is entirely free from theft, petty or otherwise. The best that any of us can do is to try to keep losses to the irreducible minimum; that minimum is always there though, and it will always stay there.

Once, I worked for a mining company out west. The general manager had a lovely Packard twin-six, for his very own, but it and the upkeep were charged to the water system. The business manager had a Franklin, and it was charged to powerhouse engines. As machinists, we knew about those things, because we charged our time to them. Those cars were just a couple perquisites that went along with their jobs.

I saw no harm in those days in taking a piece of journal brass and turning it up into an ash tray. Everybody did it occasionally. We had our perquisites too.

The higher the office, the greater the perquisites. When I see a sales manager take a week off and enjoy the World Series, under the plea that he is entertaining a favorite customer, I'm not jealous. But then if a welder in the shop brings in a broken store part from his home, and uses company material and time to weld it up, I find it increasingly difficult to crucify him for what he considers his perquisite.

Unless management goes to the

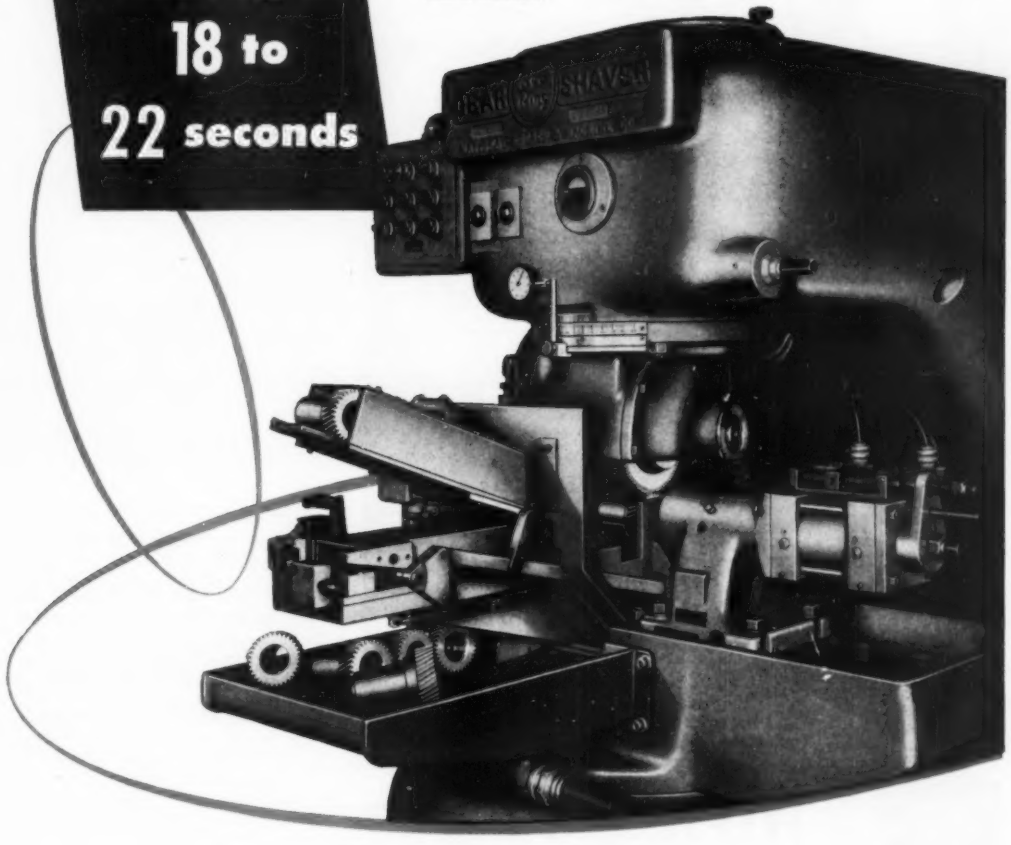
Transmission Gears

shaved in 18 to 22 seconds

The gear on this automatic transmission reverse drive sleeve is 2⅛" in diameter with a ⅞" face, 33 teeth and 14 normal D.P.

It is being shaved on this Red Ring Diagonal Gear Shaving Machine equipped for fully automatic loading at a rate of from 165 to 200 per hour, removing .0025" to .0015" of stock on tooth thickness. Rates up to 300 per hour have been recorded on smaller automotive transmission gears.

Automatic loading gives you not only the highest production rates, but it also minimizes operator fatigue and assures extremely close tolerance gears with ordinary machine operators—no special skill is needed.



WRITE FOR DESCRIPTIVE LITERATURE ON RED RING GEAR SHAVING AND AUTOMATIC LOADING

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Just Part of ONE
BIG HARDWORKING FAMILY
for INCREASED PRODUCTION!
LESS TOOL COST!
GREATER ACCURACY!
W-S LATHE BITS
W-S REAMERS
W-S END MILLS
W-S TWIST DRILLS
W-S COUNTERBORES
W-S LATHE CENTERS
W-S TOOL BITS, MILLED AND BRAZED
W-S SHELL END MILLS
THE MOST COMPLETE LINE OF CARBIDE CUTTING TOOLS
Choose from a complete range of sizes . . . wide selection of styles . . . straight or taper shanks. Quick delivery on all W-S tools from your nearest Wendt-Sonis distributor.
FREE!
SEND TODAY for CARBIDE EQUIVALENT CHART, showing carbide manufacturers' grade recommendations.
WENDT SONIS
Hannibal, Missouri
CARBIDE TIPPED CUTTING TOOLS
BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS
CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS
TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER
TURNING TOOLS • SPECIAL TOOLS

"Change Room" system such as they use in the gold camps, little "government" jobs will always be done, and some tools and material will continue to turn up missing. I certainly do not condone outright theft of expensive tools and material, but life has forced me to see a difference between that type of theft, and the case of a mechanic using a little material from his own job to repair something around his home.

I make a big distinction between the mechanic with the repair job, and the thief who steals electric drills, drill sets, brushes taps and similar "perishable" items, and steals them constantly and in quantity.

In a small plant, the best protector of company property is an alert and efficient foreman. In the large plant, the best safeguard are locked tool cribs and storerooms, a good checking system for tools and material, and an always vigilant inspection of outgoing lunchboxes, clothes and automobiles—especially the automobiles. An added protection would be the staggering of shifts, so that too many men don't go through the gates at one time.

When 20,000 men crowd out through several gates at the same time, just how much can six watchmen see of the plant's innards that are keeping step with some of those men?

James K. Matter
Detroit

•

HE WHO PAYS THE PIPER

READING this true story of a company foreman who would not try something new reminds one of the old adage, "You can't teach an old dog new tricks." It appears that our lathe hand was a young fellow who believed in modern types of tools. He believed that more production in less hours was important, not only to his pocketbook (which undoubtedly might have been his motive) but also to the company by lowering the overhead cost of the product.

Unfortunately for the owner of the company, his foreman was not inclined to reduce costs. Now this is not the first case where foremen in departments refuse to accept suggestions from workers. In every case the potential loss to the company for failure of the foreman to act is great. Not always do we have men who will go ahead and act on their own and try out new ideas.

Usually the foreman will not allow such things to happen. He protects his position by not permitting men to experiment. A good thing in some cases. In this case, however, our

Clutch roller housing
Material = 1020 steel
Hardness = Rockwell 60 "C"
Hole diameter = 1.248"
Length = 1.250"
Tolerance = ±.00025"
Finish = Smooth
Stock removal = .002"
Production = 50 per hour

Cash register part

Hydraulic brake wheel cylinder

Compound gear

For DE-BURRING . . . SIZING . . . FINISHING . . . POLISHING . . .

I.D.'s from 1/8 to 5 1/2 Inches

SUNNEN HONING
Cuts Production Costs

Close tolerances on size, accuracy and surface finish of I.D.'s are easy to hold with the Sunnen Honing Machine. It produces straight, round holes accurate to .0001" or better when required. You can get any surface finish, to 2 micro-inches RMS in hardened steel.

Production costs are kept low. Here's why:

1. Set-up time is usually less than one minute for changing to another metal—to a different hole size—or to a different surface finish.

2. Highly skilled labor isn't required. New employees can be trained quickly — *women* as well as men.
3. No costly jigs or chucking fixtures are needed.

If you size, finish, polish or de-burr holes from 1/8" to 5 1/2" in diameter, chances are that it will pay you to have a Sunnen Honing Machine. Hones open and blind holes . . . holes with keyways, ports and lands . . . metals, ceramics, glass. Complete installation costs less than $1,000.

Send the Coupon for Details

-331

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Canadian Factory: Chatham, Ontario

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☐ Please send complete information on Sunnen Honing.

☐ Have your Representative call.

Name.....Dept.....

Company.....

Address.....

City.....State.....

friend the foreman did not object to the worker buying his own tools and operating as he pleased.

Our foremen do not do these things because they do not want to make changes but usually because our industrial leaders have not properly presented the facts of business to them. No time is spent with our foremen to tell them how to conduct themselves in the most important job in industry.

It is true that a recent survey by Iowa State College indicated that many companies are doing a better job helping our foremen, but we can do much better still if we try.

Coming back to our problem at hand, who deserves the income? Well actually both. In fact both have gained in our story. The worker has gained through increased take-home pay and the company in increased production and in a lower overhead per piece produced.

The owner should take the foreman aside and explain to him why he should have accepted the idea of trying carbides. All machines that would benefit from the use of such tools should be immediately equipped. A new study of rates based on new tooling must then be undertaken. Our lathe hand should be given a prize or bonus for the idea which would increase productivity of equipment.

Here is an excellent example of where a suggestion system properly established would have prevented such a delicate situation. Also, if our foreman had known his foremanship the owner would not have had to discover the situation and he could have obtained some of the glory of increasing production. In fact our foreman might have been able to increase his

"Sure you start at something small—but remember there's always a chance for advancement"

AUTOMATIC CHUCKING MACHINE

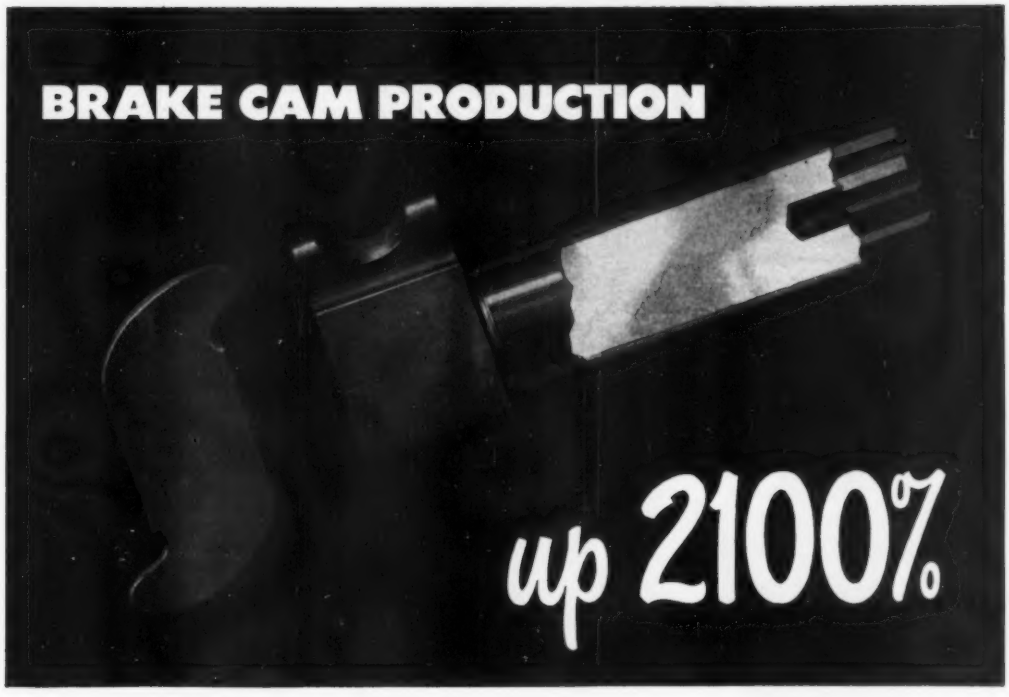
There are no half-finished pieces lying around at the end of the day when you put your work on this outstanding machine.

The "1-2-3" feature—available only on the Goss & De Leeuw Automatic Chucker —provides the means of finish machining three ends of a part without changing set-up.

Note some of the typical parts machined. Ask for illustrated literature giving further details and send samples of your work for a cost estimate on handling it on the Goss & De Leeuw.

GOSS & DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

BRAKE CAM PRODUCTION



with TOCCO* Induction Heating

MACK MANUFACTURING CORPORATION builders of famous Mack Trucks, switched from carburizing to TOCCO induction hardening their brake cams. Result: Production up from 11 to 240 parts per 8 hour shift.

SAVES MONEY—At the same time TOCCO brings costs down 15¢ on the small brake cam shown here—57¢ on the larger cam—an average savings of over 10%.

SAVES LABOR— The TOCCO machine is operated by one man—eliminates the use of three to five men in the heat treat department, frees three furnaces for other production.

SAVES HANDLING — Moreover the TOCCO machine is set in line with machining operations, eliminates 1200-foot haul to and from heat treat department.

Why not let a TOCCO engineer show you how TOCCO can cut your hardening, brazing or forging costs and speed up your production? No obligation, of course.

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TOCCO

Trade Mark Reg. U.S. Pat. Off.

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Dept. B-3, Cleveland 1, Ohio

Please send copy of 60-page catalog "TOCCO Induction Heating."

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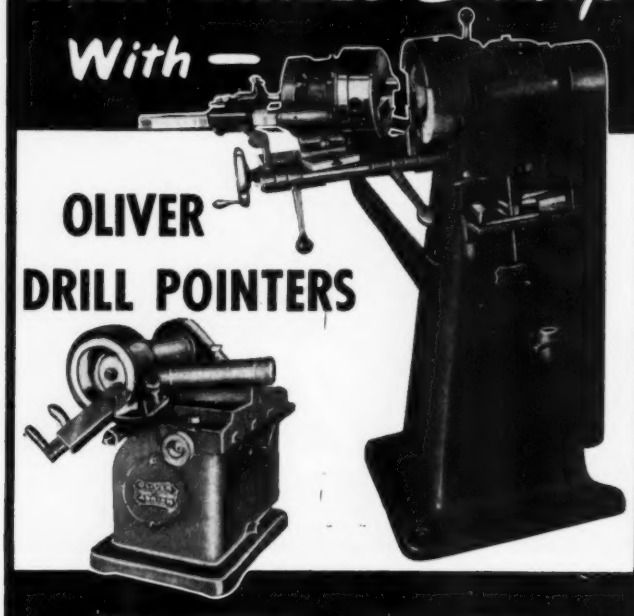
Position_____

Company_____

Address_____

City_____ Zone_____ State_____

FOR MAXIMUM PRODUCTION
KEEP DRILLS *Sharp*
With —



OLIVER
DRILL POINTERS

MORE ACCURACY · MORE EFFICIENCY
MORE PERFECT HOLES · LONGER DRILL LIFE

It has been proven that machine grinding is a more accurate method for sharpening drills. A drill, when properly machine ground, will cut faster, produce more accurate holes, and last longer than if ground by hand. Excessive drill costs and imperfect holes, in most cases, can be traced to improper grinding of the drill points. Drills sharpened on OLIVER DRILL POINTERS give balanced cut, with each lip doing equal work.

LET US PROVE IT — Send us a few of your drills to sharpen — then check the results on your own production. No obligation, of course.

THE OLIVER DRILL POINTERS

No. 510 for drills ¼" to 3" — 2-3-4 flute. Variable clearances. Variable point angles. Automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for literature that will save you dollars in your toolroom.

OLIVER INSTRUMENT CO.
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AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES

earning power by this idea of using carbide. The use of such tools have oftentimes resulted in wage increases due to the lowering of production costs to a point where the saving could be re-distributed.

A worker, or shall we say employee, deserves a monetary reward when his ideas prove to be a cost reduction. The percentage due the individual must be determined by the importance of the saving. It is not inconceivable that 10% of the first year's saving should be given the worker. This figure has been argued as too much when the savings amounts to thousands of dollars. But why should not the person responsible for a large net saving be given his share? Without him the company would not have arrived at any saving.

Industrial management today should review their thinking in regard to employee suggestions. Better public relations could result from this review. Lower operation cost can result from the employees if they know they will get just rewards. Also, don't forget that foremen can be your best salesmen of this idea if they are properly trained. Don't just take the new idea and fail to give the employee credit. Money talks today. A slap on the back is all right but doesn't achieve the end that a percentage of savings on an idea will. Free enterprise at work is the byword if you pay off. Socialistic administration is the trend if you just bleed your workers for ideas without proper reimbursement.

Charles D. Townsend
West Hartford, Conn.

•

LEADERSHIP applies to many things. It is the ability to recognize the ideas of others as well as selling our own. Complications develop when the supervisor fails to recognize a good idea. Certainly the workman is entitled to some compensation for a change he made which results in greater profit for the company. Everyone is entitled to the opportunity to be enterprising. No one of us can stop progress.

In this case we should consider the additional cost of carbide toolbits which are far more expensive than those previously in use. We must also determine if the additional speed of machine affects maintenance. If after these studies are completed the firm shows a substantial profit, they in turn should show their appreciation in some way. The firm should then adopt carbide toolbits and change the rates in comparison with profits.

Continued on p. 238

350 Subcontractors Supply Parts for Cadillac Tank Job

CLEVELAND—Cadillac Motor Car Division's Cleveland Tank Plant now has 350 subcontractors who are supplying components for the tank designated as "Tank — 76mm, Gun T41E1." Another 1000 suppliers are furnishing items other than those which go directly into the finished product.

Tank parts being built by outside sources include sub-assemblies, major assemblies and individual components. When full production is underway, Cadillac will manufacture between 60 and 80% of all tank components at the Cleveland plant. All armor arc welding on hull and turret plates will also be done there.

For security reasons, sources of supply have been located in all different parts of the country, but many subcontracts have been placed in the Cleveland and Great Lakes are also.

Two important factors in selecting subcontractors are their ability to meet production commitments and their ability to procure raw materials. This entails consideration of a supplier's production facilities, manpower, location and experience. No minimum, however, has been laid down for a subcontractor's size or capacity.

Inquiries from subcontractors may be sent to the Purchasing Division, Cadillac Motor Car Div., Cleveland Tank Plant, 6200 Riverside Drive, Cleveland 11, Ohio. Letters and calls will be referred to the proper buyer.

Martin Will Build Canberra Jet Bomber

BALTIMORE — The Glenn L. Martin Co. here will build a night intruder version of the twin-jet high speed British Canberra light bomber, recently described by Thomas K. Finletter, air secretary, as "the best available light bomber." A Canberra has been flown to the Martin plant for detailed study by Martin engineers to speed preproduction planning.

Martin will continue to develop its own light jet bomber, the XB-51, for which authorization has been given to prepare one of its two experimental models as a production prototype.

The subcontracting staff at Martin is headed by P. T. Rossi, assisted by J. G. Green, C. A. Hodgson, and J. W. Kibble.

Packard Will Build J-47 Turbojet Engines

DETROIT—Packard Motor Car Co. has one of the largest contracts yet awarded in the Detroit area for General Electric J-47 turbojet engines. The next 14 months will be needed to tool up.

There is no word yet about how much subcontracting will be done, but presumably not too much, because the job envisions tripling the present work force. Inasmuch as General Electric is supplying engineering and manufacturing assistance, it would seem that present GE suppliers might get a nod. Packard's purchasing department should be contacted on subcontracting.

Army Engineers Order Military Truck-Trailers

CINCINNATI—Trailmobile Co. has received a letter of intent to manufacture heavy duty military type truck-trailers for the Corps of Engineers, U.S. Army. Contract cost of the trailers is more than $2 million.

The military trailers will be built at the Cincinnati plant of Trailmobile and production will be started in several weeks. The defense production contract will not interfere with the company's output of truck-trailers for civilian use, Trailmobile officials stated.

Boeing Jet Job Will Require Subcontracting

SEATTLE—A large amount of subcontracting is expected to be let for the newly-designed B-52 jet bomber which the Air Force has just authorized Boeing Airplane Co. to put into production. Expansion of Boeing plants at Seattle will result from the B-52 program.

Most of the work, including final assembly, is expected to be done in Seattle plant No. 2, adjacent to Boeing Field. This plant now is engaged principally in the modification of B-29s and B-50s. First version of the B-52 is expected to be equipped with eight Pratt & Whitney J-57 jet engines which the Air Force hopes will develop about 10,000 lb thrust. Later versions are expected to have turboprop engines.

Reopen Chance Vought Plant

STRATFORD, Conn. — Aviation Corp. of America will use the 61-acre former Chance Vought Aircraft plant here for work on its government contracts to build airplane engines. AVCO expects to be in full production in a year. The plant was vacated by Chance Vought in 1948, when that United Aircraft Corp. division set up a plant in Dallas, Texas.

Buick to Build Sapphire Engine

FLINT, Mich. — Buick Division of General Motors Corp. has received a $25 million contract to produce the British-designed J-65 Sapphire jet engine. The engine will be used in the Republic S-84-F Thunderjet, which GM will build at an assembly plant in Kansas City. The Sapphire will be produced under license from Wright Aeronautical Corp., which holds American patents.

Ford Gets $195-Million Medium Tank Contract

DETROIT—Ford Motor Co. has been awarded a $195-million contract for medium tanks to be built at a new Detroit-area plant. It is expected that as many as 5000 subcontractors (largely among the 6000 Ford now uses in regular work), will manufacture a majority of the individual parts of the tank.

An Ordnance objective is to dovetail much of this subcontracting with that for the Cadillac Cleveland tank job. In charge of Ford's tank program: David W. Lee, manager, Tractor & Industrial Engine Div.

FAST SOLUTION

to your subcontract problems:

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every-issue SUBCONTRACTING NEWS section of American Machinist

Need subcontractors who can give you efficient low-cost help in meeting production schedules on government contracts?

Looking for subcontract work . . . to keep your plant busy and producing in these emergency times?

Advertising in this new, timely, and much-needed section of *American Machinist* is a fast, low-cost way to get in touch with the right people in the right companies.

Here, in every issue, *American Machinist* editors will be reporting all the latest news, from Washington and elsewhere, which is important to both prime contractors and subcontractors on government business.

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Obviously, this news is of great interest to every metalworking executive . . . and your advertising in this SUBCONTRACTING NEWS Section will get top readership, under ideal conditions, from metalworking executives everywhere.

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The McGraw-Hill Magazine of Metalworking Production

McGraw-Hill Building, New York 18

American Machinist

Fisher Body to Build Tanks

DETROIT—A $195 million contract for tank construction has been announced by Fisher Body Div. of General Motors Corp. The tanks will be built at the plant in Grand Blanc, Mich., where Fisher Body built tanks during World War II.

To Make Rocket Components

ST. LOUIS — American Stove Co. will start production soon on rocket metal components for Army Ordnance. A portion of the firm's St. Louis domestic gas range factory is now being converted to accommodate the project, and production will commence in the near future.

$8-Million Contract for Shells

CLEVELAND—Murray Ohio Mfg. Co. has been awarded an $8 million contract to produce 350,000 shells, Cleveland Ordnance District has announced. The shells will be produced at the former American Coach & Body Co. plant which Murray Ohio acquired in December.

To Work on Guided Missiles

TUCSON, Ariz. — Hydraulic valves and presses, and subcontracts for guided missiles parts will be produced here by Oracle Engineering Corp.

LATEST DEFENSE CONTRACTS...

MANUFACTURERS seeking subcontracting work on prime contracts awarded by Army, Navy and Air Force should contact prime contractors listed below, many of whom will farm out parts of the bigger jobs. This list of contracts in metalworking is excerpted from weekly releases of the Department of Commerce.

ARMY ORDNANCE AWARDS

Machine Tool & Die Co., Detroit, gudgeons, $200,244.

Food Machinery & Chemical Corp., San Jose, Calif., collars, shaft, etc., $124,445; gaskets, yoke, $312,492.

W. H. Anderson Co., Inc., Detroit, rope clamps, $211,666; air compressors, $980,514.

Milwaukee Electric Tool Corp., Milwaukee, electric drills, $273,536.

Homelite Corp., Port Chester, N. Y., generators, $106,333.

Mechanics Universal Joint Div., Rockford, Ill., journal bearings, $135,994.

Modine Mfg. Co., LaPorte, Ind., radiator, $433,412.

Motive Parts Co. of America, Inc., Chicago, pumps, engine assembly, $95,503.

Hart Hydraulics, Inc., Detroit, flanges, cone, etc., $235,726.

Mack Mfg. Corp., Plainfield, N. J., disc, clutch driven, $97,600.

Ford Motor Co., Dearborn, Mich., stake trucks, $18,515,441; panel trucks, $5,734,738; engines, assembly, and parts necessary to rebuild 4000 GAA and GAF engines, $15,000,000.

Willys-Overland Motors, Inc., Toledo, cargo trucks, $268,198.

Electric Autolite Co., Toledo, generators; stud, shield cover, $195,549.

Motor Wheel Corp., Lansing, Mich., disk, track roller; disk, road wheel, $634,160; disk, torsion bar, $2,561,500; rims, wheel & disk, $828,000.

ACF Brill Motors Co., Philadelphia, buses integral, $5,750,265.

GMC Truck & Coach Div., General Motors, Pontiac, Mich., buses integral, $11,554,200.

General Armature & Mfg. Co., Lock Haven, Pa., armatures, engine, assembly, $125,845.

Union Steel Casting Div., Blaw-Knox Co., Pittsburgh, steel armor, $1,300,000.

Zaiger Corp., Lynn, Mass., switches, $518,000.

K-D Lamp Co., Cincinnati, plugs, single and double, $140,070.

Triplex Corp. of America, Pueblo, Colo., pistons, engine, assembly, $150,080.

Federal Mogul Service Div., Federal Mogul Corp., Coldwater, Mich., bearings, $321,288.

Chrysler Corp., Detroit, cargo trucks, $33,500,000; cabs, hard top, $280,276.

Tulsa Winch Div., Vickers, Inc., Tulsa, Okla., collars, clutch, $147,550.

Premier Industries Corp., Monroe, Mich., shoes steering brake, $134,972.

United Motors Service Div., General Motors Corp., Detroit, roller bearings, $140,910.

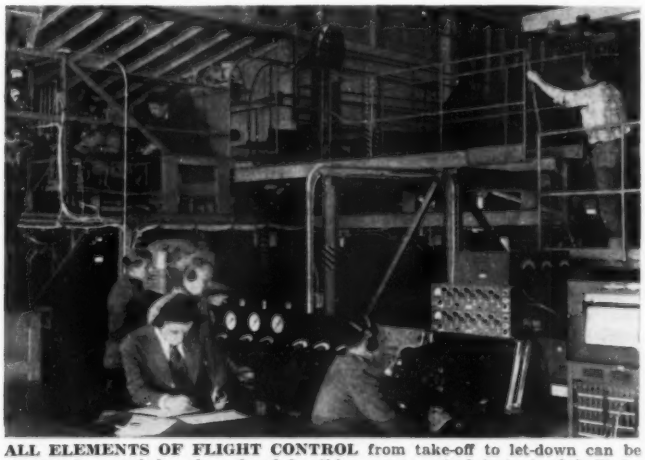
Kenworth Motor Truck Corp., Seattle, transfer assembly; flanges, $280,742.

Federal Motor Truck Corp., Seattle, gear shift forks; front axle gears; transmission pionions; drive gears; shift levers; lock power screws, $122,325; trucks (tractor), etc., $982,311.

Gar Wood Industries, Inc., Wayne, Mich., winches, $147,912.

Fargo Motor Corp., Detroit, stake platform trucks, $286,132.

(Continued next page)



ALL ELEMENTS OF FLIGHT CONTROL from take-off to let-down can be simulated, recorded and analyzed by this power control test stand built by Northrop Aircraft test laboratory engineers in developing the full power control system used on the Air Force's Scorpion F-89 all-weather interceptors. Known as "Iron Ike," the test stand expedited at considerable savings in time and costs development of the F-89 control system. Man in light suit, upper right, mans cockpit controls. Engineer in dark suit, upper left, supervises test, prescribing maneuvers for "flight" plan under study. Engineers in foreground monitor recording equipment

ORDNANCE AWARDS

. . . continued

Chas. J. Martin & Sons, Wayne, Mich., anchor reverse brake, $115,709.

Joseph Weindenhoff, Chicago, testers, volt. range; bench, starters, testers, distributors, $528,502.

Studebaker Corp., South Bend, Ind., cargo trucks, $12,380,000.

Long Mfg. Div., Borg-Warner Corp., Detroit, plate, clutch drive, $936,937.

Leterstone Sales Co., Chicago, bearings, $127,800.

Standard Products Co., Cleveland, hood, hatch assembly, $203,100.

Utility Trailer Mfg. Co., Los Angeles, gear, landing assembly, $151,250.

Reynolds Metals Co., Aluminum Div., Louisville, Ky., extrusions, aluminum alloy body, $146,565.

Richmond Foundry & Mfg. Co., Inc., Richmond, Va., spare parts for 90 and 105mm guns, with special tooling, $254,208.

Western Cartridge Co., Div., Olin Industries, Inc., East Alton, Ill., ball cartridges, .22 cal. long rifle, $320,894; ball cartridges, .30 cal., $1,000,000.

Federal Cartridge Corp., Minneapolis, ball cartridges, .22 cal. long rifle, $148,900.

Convair Opens Plant For Guided Missiles Production

SAN DIEGO—The nation's first integrated production plant for guided missiles at supersonic speed has been opened here by Consolidated Vultee Aircraft Corp. under a contract with the Navy's Bureau of Ordnance. Convair has been designing, manufacturing and testing guided missiles since 1944, including supersonic attack-type rockets and shipboard-launched anti-aircraft missiles.

Initial production will be on a supersonic anti-aircraft missile. Hiring of 1500 persons, who will work in a 200,000 sq ft plant, started March 1. First production goals will be reached within a few months, it is expected.

The guided missile plant, to be known as Division 3, will be a completely self-contained operation managed by Gage Irving, who has been assistant to Convair president Lamotte T. Cohu. Some of the production tools have been furnished by the Navy Bureau of Ordnance.

Graflex, Inc., Rochester, N. Y., sights and spare parts, $619,647.

ATF, Inc., Elizabeth, N. J., alt. fire control systems for self-propelled field artillery vehicles, $2,000,000.

Saginaw Steering Gear Div., General Motors Corp., Saginaw, Mich., operating slides for .30 cal. M-2 carbine facilities, $1,712,043.

Burroughs Adding Machine Co., Detroit, metal parts for fuzes, $536,037.

Pollak Engrg. & Mfg. Corp., Newark, N. J., leaflet bombs (empty), $434,500.

Arnold Copeland Co., Inc., South Boston, Mass., primer, percussion, metal parts, $122,430.

Carboloy Co., Inc., Detroit, shot, 90-mm, metal parts assembly, $3,909,744.

SIGNAL CORPS AWARDS

Minshall-Estey Organ, Inc., Brattleboro, Vt., public address sets, $100,000.

Emerson Radio & Phonograph Corp., Philadelphia, detector sets and parts, $2,000,000; radio sets, $2,617,927.

Johnson Service Co., Milwaukee, radiosonde modulators, $572,400.

Hallicrafters Co., Chicago, radio sets, $1,250,000.

Miller Equipment Co., Inc. Venango County, Pa., lineman's equipment, $464,580.

Century Tool Co., Philadelphia, tool equipment, $142,204.

General Dry Batteries, Inc., Lakewood, Ohio, batteries, $98,119.

J. & H. Smith Mfg. Co., New York, antenna equipment, $1,952,014.

Lionel Corp., Hillside, N. J., GRC controls, $200,000.

Lewyt Corp., Brooklyn, radio sets, $300,000.

Arvin Industries, Inc., Columbus, Ind., spools, $500,000.

Tele King Corp., New York, radio sets, $400,000.

Rauland-Borg Co., Chicago, radio terminal sets, $500,000.

Epsey Mfg. Co., New York, radio relay sets, $300,000.

W. L. Maxson, New York, power supply, $200,000.

Crosley Corp., Cincinnati, radio sets, $400,000.

Kollsman Instrument Co., Elmhurst, N. Y., radisonde, $100,000.

Brunswick Radio & Television Co., New York, control boxes, $150,000.

Rauland Borg Co., Chicago, radio relay sets, $250,000.

Cornell - Dubilier Corp., South Plainfield, N. J., power supply, $150,000.

Automatic Electric Sales Corp., Chicago, switchboards, telephone, automatic operator, $403,130; maintenance & repair parts for telephone equipment, $166,800.

Presto Recording Corp., Hackensack, N. J., sound locating sets, $1,808,562.

Molded Insulation Co., Philadelphia, radiosonde transmitters, $128,843.

Willard Storage Battery Co., Cleveland, battery packs, $151,606.

Westline Electronics Co., Los Angeles, crystal units, $149,127.

A. C. Gilbert Co., New Haven, Conn., power supply, $180,000.

Western Electric Co., New York, repeator telephones, $523,000 telegraph terminals, $3,000,000; telephone terminals, $1,600,000.

Times Facsimile Corp., New York, facsimile equipment, $110,000.

Kleinscheidt Laboratories, Inc., Deerfield, Ill., teletype sets, $1,900,020.

Eastern Co., Cambridge, Mass., public address sets, $100,000.

Kellogg Switchboard & Supply Co., Chicago, telephone switchboards, $300,000; ringer sets, $1,200,000; telegraph terminal sets, $695,000.

W. C. Fleck & Bros., Inc., Jenkinstown, Pa., tool equipment, $123,350.

Joseph J. Bredsmann, Chicago, tool equipment, $124,155.

U. S. Rubber Co., New York, telephone coil assembly, $2,500,000.

National Carbon Div., Union Carbide & Carbon Corp., New York, batteries, $816,018.

George Evans Corp., Moline, Ill., steel reels, $175,427.

Burgess Battery Co., Freeport, Ill., batteries, $213,360.

Hogan Labs., Inc., New York, facsimile sets, $276,603.

Wilcox Electric Co., Kansas City, Mo., amplifier group, $100,000.

Wilcox Electric Co., Inc., Kansas City, Mo., remote control consoles, $200,130.

Highway Trailer Co., Edgerton, Wis., 2½-ton trucks, earth borer & pole setter, $800,000.

Barker & Williamson, Inc., Philadelphia, radio sets, $500,000.

General Electric Co., New York, rawin sets, $1,000,000.

Raytheon Mfg. Co., Waltham, Mass., radio sets, $500,000; electron tubes, $119,160.

ARF Products, River Forest, Ill., radio relay spare parts, $1,000,000; signal generators, $659,500.

John R. Hollingsworth Corp., Clifton Heights, Pa., engine generators, $200,000; power units, $250,000.

Jacobson Mfg. Co., Racine, Wis., power units, $115,000.

Kohler Co., Kohler, Wis., power units, $250,000.

O'Keefe & Merritt Co., Los Angeles, power units, $3,000,000.

D. W. Onan & Sons, Minneapolis, power units, $1,300,000.

Cook Electric Co., Chicago, switching signals, $110,557; terminal boxes, $530,240; repeating coils, $110,552.

Service Corp. of America, New Hyde Park, N. Y., radio sets, spare parts, $247,500.

Triplet Electric Instrument Co., Bluffton, Ohio, tube testers, $472,-313.

Sylvania Electric Products, New York, electron tubes, $90,000.

Kings Electronics, Inc., Brooklyn, cable assembly, $100,000.

Federal Telephone & Radio Corp., Clifton, N. J., radio transmitter and receiver equipment, $8,000,000; radio sets, $300,000; telegraph terminals, $1,400,000; switchboards, $2,500,000; electron tubes, $1,252,992.

Midland Mfg. Co., Kansas City, Mo., crystal units, $100,000.

Siltronic Co., Pittsburgh, switch boxes, $111,231.

Teletype Corp., Chicago, teletypewriters, $960,000; parts, $1,000,000.

RCA Service Co., Inc., Camden, N. J., repair of Signal Crops radio sets, $143,748.

ARMY ENGINEERS AWARDS

The Shovel Co., Elyria, Ohio, spare parts for Thew Shovel equipment, $125,000.

LeRoi Co., Milwaukee, air compressors, $130,000.

Buffalo-Springfield Roller Co., Springfield, Ohio, rollers, $600,000.

Aeroil Products Co., Inc., South Hackensack, N. J., asphalt kettles, $250,000.

Rosco Mfg. Co., Minneapolis, asphalt kettles, $140,000 water distributors, $400,000.

Gray Co., Minneapolis, lubricators, $325,000.

Harrisburg Steel Co., Harrisburg, Pa., cylinders, $450,000.

Taylor-Wharton Iron & Steel Corp., Highbridge, N. J., cylinders, $300,000.

United Motors Service Div., General Motors Corp., Detroit, spare parts, $225,000.

Columbian Steel Tank Co., Kansas City, Mo., water tanks, $300,000.

Waukesha Motor Co., Waukesha, Wis., spare parts for Waukesha Motor Co. equipment, $100,000.

Dorsey Trailer Co., Elba, Ala., trailers, 4-wheel, $100,000.

Electric Wheel Co., Quincy, Ill., trailers, 4-wheel, $1,000,000.

Southwest Welding Co., Alhambra, Calif., scrapers, $100,000.

Heil Co., Milwaukee, scrapers, $400,000.

Vapor Heating Corp., Chicago, heaters, $200,800.

Inland Steel Products Co., Milwaukee, airplane landing mats, $4,000,000.

Morton Mfg. Co., Chicago, airplane landing mats, $2,000,000.

Clark Grave Vault Co., Columbus, Ohio, airplane landing mats, $4,000,000.

Highway Steel Products Co., Chicago Heights, Ill., airplane landing mats, $2,000,000.

National Gypsum Co., Buffalo, N. Y., airplane landing mats, $4,-000,000.

Ceco Steel Products Co., Chicago, airplane landing mats, $4,000,000.

Municipal Supply Co., South Bend, Ind., distributors, water, $425,000.

Ditto Inc., Chicago, duplicators, $180,800.

QUARTERMASTER AWARDS

Junkunc Bros., Chicago, brass padlocks, $123,240.

Food Machinery & Chemical Corp., Riverside, Calif., nailing machines, $251,000.

Yale & Towne Mfg. Co., Stamford, Conn., padlocks, $174,570.

Chicago Forging & Mfg. Co., quick release snaps, $115,200.

Westinghouse Electric Co., Pittsburgh, coolers, drinking water, electric, $101,524.

American Pumps, Inc., Cincinnati, gasoline pumps, $133,050.

Buffalo Weaving & Belting Co., Philadelphia, metal burial caskets, $1,099,650.

Cincinnati Coffin Co., Cincinnati, metal burial caskets, $1,086,750.

Read Machinery Div., Standard Stoker Co., Inc., York, Pa., mixing machines, vertical, $343,789.

Triumph Mfg. Co., Cincinnati, mixing machines, vertical, $346,865.

Consolidated Industries, Inc., Memphis, metal folding chairs, $380,337.

(Continued next page)

ACCURACY
Efficiency
Economy

These three factors are the key-note of our special tools and machinery. Columbus Die-Tool builds and designs the tool for your particular purpose and will solve the toughest tooling problems effectively and promptly. Do not hesitate to consult us, our experience in this field is most comprehensive.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUUNCHES AND DIES

QUARTERMASTER AWARDS

... continued

National Enameling & Stamping Co., Milwaukee, tent stove bases, $172,452; steel drums, inflammable liquid, $2,939,387.

S. Blickman, Inc., Weehawken, N. J., coffee urns, $137,225.

Hercules Food Service Equipment Co., Brooklyn, stoves, ranges and coffee urns, $247,875.

National Steel Container Corp., Chicago, steel drums, inflammable liquid, $1,985,302.

Allsteel Equipment, Inc., Aurora, Ill., wall lockers, $342,219.

Barlor Metal Products, Inc., Goshen, Ind., wall lockers, $491,596

Borger Furnace Mfg. Co., Pittsburgh, wall lockers, $422,134.

Globe American Corp., Kokomo, Ind., heaters, immersion type, for cars, $107,750.

E. O. Habhegger Co., Philadelphia, portable gasoline pumps, $238,916.

Precision Staple Corp., New York, wire staples, preformed, $113,211.

NAVY AVIATION AWARDS

B. F. Goodrich Co., Akron, Ohio, deicer boots for aircraft, $351,554; fuel cells for aircraft, $270,481.

General Electric Co., Schenectady, N. Y., turbo-superchargers for aircraft, $132,899 generators & regulators, $200,000; trailer-mounted engine-driven aircraft energizers, $520,000.

American Smelting & Refining Co., New York, electroplating anodes, balls, without tools, $194,250.

Harvick Mfg. Co., Lynwood, Calif., strut assembly, wing jury, for aircraft, $122,514.

Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y., armor plate for aircraft, $103,606.

Engineering Research Corp., Riverdale, Md., fuel tanks, external, for aircraft, $1,819,200.

Glenn L. Martin Co., Baltimore, maintenance parts for aircraft, $107,610.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., water pressure indicators & transmitters, $157,815; starters, $289,906.

Sperry Gyroscope Co., Great Neck, L. I., N. Y., directional gyro indicators, $150,424.

Jack & Heintz Precision Industries, Inc., Cleveland, generators & control boxes, $180,000.

Arcos Corp., Philadelphia, electrodes (covered); steel (mineral covered-low hydrogen), $181,440.

Marine Aircraft Corp., Ft. Worth, Tex., tanks, for aircraft, $247,200.

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y., generators, pulse, used in production and control of spark impulses, $120,919; maintenance parts for use on Pratt & Whitney engine magneto assembly, $378,289.

Aerol Co., Inc., Burbank, Calif., wheel assembly; solid tail for use on aircraft, $99,960.

Revere Copper & Brass, Inc., Baltimore, sheets, Naval brass, half hard and soft comp., $114,375.

Drayer-Hanson, Inc., Los Angeles, fuel tanks, external, $1,494,912.

Ansonia Electrical Co., Ansonia, Conn., cable, radio, non-flexing service, heat & flame resistant, $140,927.

BUREAU OF SHIPS AWARDS

Harbor Boat Building Co., Terminal Island, Calif., construction of 138-ft auxiliary motor minesweepers, $2,500,000.

Henry B. Nevins, Inc., New York, 138-ft minesweepers, $2,500,000.

Quincy Adams Yacht Yard, Inc., Quincy, Mass., 138-ft minesweepers, $1,500,000.

Henry C. Grebe & Co., Inc., Chicago, 138-ft minesweepers, $2,500,000.

Burger Boat Co., Manitowac, Wis., 138-ft minesweepers, $1,500,000.

Frank L. Sample, Jr., Inc., Boothbay Harbor, Me., 138-ft minesweepers, $2,500,000.

Consolidated Shipbuilding Corp., New York, 138-ft minesweepers, $2,500,000.

James Russel Engineering Work, Inc., Boston, barges, $282,400.

Wayne Pump Co., Fort Wayne, Ind., gasoline pumps, $180,972.

McQuay Inc., Minneapolis, chilled water unit coolers, $133,253.

Linde Air Products Div., Union Carbide & Carbon Corp., New York, oxygen-nitrogen plants, $350,000.

Carrier Corp., New York, refrigerating condensing units, $103,052.

Lanagan & Hoke, Inc., Philadelphia, noise measuring sets, $366,668.

Tacoma Boat Building Corp., Tacoma, Wash., construction of 57-ft minesweeping boats, $1,000,000.

Simms Brothers, Dorchester, Mass., 57-ft minesweeping boats, $1,000,000.

John Trumpy & Sons, Inc., Annapolis, Md., 57-ft minesweeping boats, $1,000,000.

South Coast Co., Newport Beach, Calif., 57-ft minesweeping boats, $1,000,000.

Vickers, Inc., Detroit, services and material to modify government furnished hoist power drives, $200,000.

YARDS & DOCKS AWARDS

Great Lakes Steel Corp., Ecorse, Mich., bulkhead material, $2,112,583.

Hanson Clutch & Machinery Co., Tiffin, Ohio, crawler cranes, $413,210.

Oshkosh Motor Truck, Inc., Oshkosh, Wis., snow plows, $227,880.

Wm. Bros Boiler & Mfg. Co., Minneapolis, snow plows, $557,952.

Snook Snow Plow Co., St. James, Minn., snow plows, $155,808.

Sicard Industries, Inc., Watertown, N. Y., snow plows, $558,417.

Klauer Mfg. Co., Dubuque, Iowa, snow plows, $838,880.

OTHER NAVY AWARDS

Carnegie-Illinois Steel Corp., Washington, D.C., steel plates, $974,824.

Jones & Lamson Machine Co., Springfield, Vt., turret lathes, saddle type, $141,120.

Service Caster & Truck Corp., Washington, gasoline fork trucks, $179,665.

Rheem Mfg. Co., New York, steel drums, $362,500.

Le Roi Co., Milwaukee, portable air compressors, with tools and accessories, $102,419.

Clark Equipment Co., Buchanan, Mich., fork trucks, $318,802.

Herbrand Div., Bindham-Herbrand Corp., Fremont, Ohio, box wrenches, $122,927.

Towmotor Corp., Cleveland, forklift trucks, $385,000.

Rockford Machine Tool Co., Rockford, Ill., hydraulic slotters, $167,280.

Falk Corp., Milwaukee, repair parts for main reduction gears and coupling parts, $190,608.

Cleveland Diesel Engine Div., General Motors Corp., repair parts for diesel engines, $7,189,729.

Hotpoint, Inc., Chicago, repair parts for electric ranges, ovens and hotplates, $145,191.

Radio Corp. of America, Harrison, N.J., electron tubes, $197,700.

Norris Stamping & Mfg. Co., Los Angeles, brass cartridge cases, 8 in. .55 cal., $481,800.

U.S. Thermo Control Co., Minneapolis, refrigerators and units, $712,356.

American Bosch Corp., Springfield, Mass., repair parts for diesel engines, $929,513.

Farrel-Birmingham Co., Inc., Ansonia, Conn., repair parts for reduction gears, $132,881.

Electric Storage Battery Co., Philadelphia, battery separators, $227,333.

General Electric Co., Schenectady, N. Y., repair parts for main propulsion motors, $102,699.

Monarch Machine Tool Co., Sidney, Ohio, lathes, toolmaker's 10 by 20 in. centers, floor type, $186,425.

AIR FORCE AWARDS

Steelcraft Mfg. Co., Rossmoyne, Ohio, maintenance docks, transport dolly, $151,749.

R. R. Robertson Co., Chicago, still picture camera and spares, $120,623.

Bill Jack Scientific Instrument Corp., Solana Beach, Calif., camera control system and magazines, $510,000.

Skinner Purifiers Div., Bendix Aviation Corp., Detroit, fuel filter kits, $453,635.

Ideal Electric & Mfg. Co., Mansfield, Ohio, motor generators, $353,925.

Carrier Corp., Syracuse, N. Y., coolers, stationary, $446,876.

Leewy Construction Co., Inc., New York, die forging press and extrusion press, $10,932,052.

Compco Corp., Chicago, plotting tables, $113,441.

Elastic Stop Nut Corp. of America, Union, N. J., steel nuts, $204,936; aircraft hardware, $184,192.

Morse Instrument Co., Hudson, Ohio, timers, $135,359.

Parker Appliance Co., Cleveland, packing O-rings, $233,573.

Sperry Gyroscope Corp., Great Neck, L. I., N. Y., airborne ignition engine analyzers, $618,000.

Deiron Co., Inc., Los Angeles, steel nuts, $575,081.

Goodyear Tire & Rubber Co., Akron, Ohio, wheel & brake assemblies, $245,197.

Hammond Mfg. Corp., Pasadena, Calif., metal shipping containers, $347,400.

United States Steel Co., Cincinnati, steel angle and plate, $640,109.

Simmons Brothers, Inc., Long Island, N. Y., printers, $203,233.

Whiting Corp., Harvey, Ill., nacelle stand assemblies, $112,102.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., transmitters, fuel flow type, $172,923; tester assemblies, $115,900.

General Electric Co., Schenectady, N. Y., generators, $249,147; major components for radio sets, $365,750.

Phaostron Co., South Pasadena, Calif., generator field control relays, $142,728.

R. E. Dye Machine & Supply, Breckenridge, Tex., release, bomb rack, $181,556.

B. F. Goodrich Co., Akron, Ohio, deicer shoes, $168,059.

Schwien Engineering Co., Los Angeles, modification and repair gyro assemblies, $1,448,195.

North American Aviation, Inc., Los Angeles, misc. assemblies, subassemblies, kits and spare parts for aircraft, $2,000,000; spare parts for airplanes, $4,813,083.

Radioplane Co., Van Nuys, Calif., target aircraft, spares for aerial targets, $15,280,000.

Beech Aircraft Corp., Wichita, Kans., fuel tanks, $390,078.

Minneapolis-Honeywell Regulator Co., Minneapolis, vertical gyro indicator, $1,250,000.

Eicor, Inc., Chicago, alternators and regulators, $663,076.

Sorensen & Co., Inc., Stamford, Conn., power unit, gun bomb rocket sight, $1,000,000.

Beech Aircraft Co., Wichita, Kans., jettisonable fuel tanks, $4,974,000.

Peters Dalton, Inc., Detroit, metal shipping containers, $971,495.

American Locomotive Co., Dunkirk, N. Y., metal shipping containers, $971,495.

Transducer Corp., Boston, trainer-radar, $3,905,000.

Magnavox Co., Ft. Wayne, Ind., control assembly bomb arming, $123,014.

Jack & Heintz Precision Industries, Cleveland, starters, $635,905.

Tube Distributors Co., Inc., Brooklyn, steel tubing, $132,670.

Reynolds Metals Co., Louisville, Ky., aluminum sheet, $115,526.

Mirax Chemical Products Corp., St. Louis, Mo., metal shipping containers, $216,534.

Aircraft Hardware Mfg. Co., Inc., Bronx, N. Y., aircraft close tolerance steel bolts, $142,545.

Douglas Aircraft Co., Inc., Santa Monica, Calif., model airplanes, $12,000,000.

Sundstrand Machine Tool Co., Rockford, Ill., constant speed drives, $310,000.

Surface Combustion Corp., Toledo, heaters, engine and shelter, $1,316,778.

Keco Industries, Inc., Cincinnati, portable aircraft, coolers, $759,924.

Boeing Airplane Co., Seattle, modification of power racks, $218,797.

Latest NPA Orders Affecting Metalworking . . .

WASHINGTON—Latest NPA orders are summarized here. For previous orders refer to *AM*—Jan. 22, '51, p157-158; Feb. 5, '51, p172; Feb. 19, '51, p237.

M-1—Steel (As amended Feb. 23): Provides rules for placing, accepting, and scheduling rated orders for iron and steel. Requires acceptance of rated orders based on a percentage of previous shipments, and provides for allotment, and maximum inventories. Purpose is to provide equitable distribution of rated orders. Supersedes some provisions of Reg 1 and 2.

M-1—Steel, Supp 4 (Feb. 16): Schedules 9000 tons of steel per month, April through June, to US shipyards for repair and conversion of seagoing vessels.

M-2—Rubber (As amended Feb. 1): Prohibits multiplicity of style, type, and color in rubber products. Reduces civilian use of new rubber from 80% to 76% (in March) of base period (year ending June 30, '50). Prohibits use of natural rubber in certain listed products. Requires 50% increase in camelback (for recapping) production. Permits private import of some low grade rubber.

M-4—Construction (As amended Feb. 9): Exempts structures for radio and television broadcasting, newspaper plants, and book and periodical publishers from necessity of obtaining NPA authorization. Also exempts private residences though they contain incidental office space for occupant. **(As amended Feb. 19):** Exempts alterations, additions, and improvements to hotels, office buildings, and loft buildings costing not more than 25¢ per square foot in a 12-month period, and to other prohibited structures costing not more than $5000.

(Continued on next page)

NPA Orders ... continued

M-5—Aluminum (As amended Feb. 1): Requires aluminum producers and fabricators to accept a larger percentage of DO orders. Percentages vary from 30-60%.

M-7—Use of Aluminum (As amended Feb. 1): Prohibits use effective April 1 in 200 listed items. Prohibits use of more or better grade aluminum than is necessary for functional operation of any item. Prohibits use effective June 1 of aluminum in any item solely for decorative or ornamental purposes. **(As amended Feb. 21):** Requires gradual elimination of manufacture of aluminum windows and air ducts between now and June 30.

M-8—Tin (As amended Jan. 23): Prohibits use of tin in certain listed products. Further prohibits use of tin or any alloy containing more than 1.5% tin in any product not specifically authorized by NPA (NPA certification is required with all deliveries). Prohibited items may be completed up to May 1 if started before March 1.

M-12—Copper and Copper-Base Alloys (As amended Feb. 19): Relaxes restrictions to permit use of copper on prohibited items if held in inventory and unsuitable for other purposes. Prohibits use in a new list of products effective April 1, but with same provision for metal in inventory. **(As amended Feb. 27):** Permits use of copper fins in heating and ventilating equipment for home and other construction until April 1 (previously prohibited after Mar. 1). **Dir. 1 to M-12 (Feb. 1):** Producers and users can readjust base period averages if operations were shut down for more than 15 consecutive days during the first half of 1950.

M-14—Nickel (As amended Jan. 23): Prohibits use in a wide range of listed products of nickel silver or nickel plate after March 1 and of nickel-bearing stainless steel and high-nickel alloys after April 1. Articles started prior to these dates may be completed within two months after prohibited date, sold and used at any time. **(As amended Feb. 8):** Manufacturers may not extend priority ratings to replace nickel used prior to January 1 for the manufacture of any nickel-bearing alloy material. A three-month period was previously allowed to replace this nickel taken from inventory. **(As amended Feb. 28):** Permits use of nickel held in inventory March 1 in prohibited items provided it is not suitable for use by holder in more essential items.

M-16—Distribution of Copper and Copper-Base Alloy Scrap (As amended Jan. 31): Miscellaneous producers, such as foundries, may melt and process copper scrap generated in their own plants.

M-20—Iron and Steel Scrap (As amended Jan. 29): Permits NPA to increase or decrease scrap inventories in hands of consumers, allocate scrap, and specifically direct the manner and quantities in which deliveries can be made. This permits NPA to take quick action to make scrap available in emergency cases.

M-24—Tin Plate and Terne Plate (Jan. 27): Prohibits use except in certain listed items and specifies the thickness of tin or terne metal permitted in each case. Only secondary tin can be used in producing terne metal. Items in process prior to March 1 can be completed up to April 30.

M-25—Cans (Jan. 27): Use of tin or terne plate is prohibited in cans except for listed uses. No restrictions on perishable foods. Other permitted uses limited to 90% of their first-quarter 1950 or first-quarter 1949 base. Stocks in inventory Jan. 27 may be used without restriction. **(As amended Feb. 23):** Adds certain items to list of permitted uses and changes some plate specifications.

M-26—Tin Plate Closures (Jan. 27): Prohibits use of closures, such as bottle caps and jar lids, except in packing of listed products and then only when the coating meets specifications varying with the product.

M-27—Collapsible Tubes (Jan. 27): Restricts amount of tin to be used in collapsible tubes, the percentage varying with the product packaged.

M-33—Molybdenum (Jan. 27): Limits molybdenum stocks to a 20-day supply.

M-37—Zinc Scrap—Toll Agreements (Feb. 14): Prohibits acceptance of zinc scrap for converting where the owner would retain title after processing (toll agreement) without authority from NPA. No dealer can accept scrap if his total inventory would exceed one third by weight of total deliveries in first six months of 1950. Galvanizer's dross can only be converted to zinc dust.

M-38—Lead (Feb. 16): Limits inventories to 60-days supply or "practical minimum working" supply, whichever is less. Requires reports showing production, distribution, importation, use, and inventories.

M-39—Antimony (Feb. 16): Limits inventories to 60-days supply or "practical minimum working" supply, whichever is less. Requires reports showing production, distribution, importation, use, and inventories.

Reg 4—Maintenance, Repair, and Operating Supplies and Minor Capital Additions (Feb. 27): Provides for DO-97 rating for firms to obtain limited quantities of these supplies and minor capital additions. Does not limit unrated procurement except that in any quarter in which use is made of this rating both rated and unrated supplies are subject to the limitations of the regulation. **Dir 1 to Reg 4 (Feb. 27):** Establishes procedure for transition to operation under Reg 4.

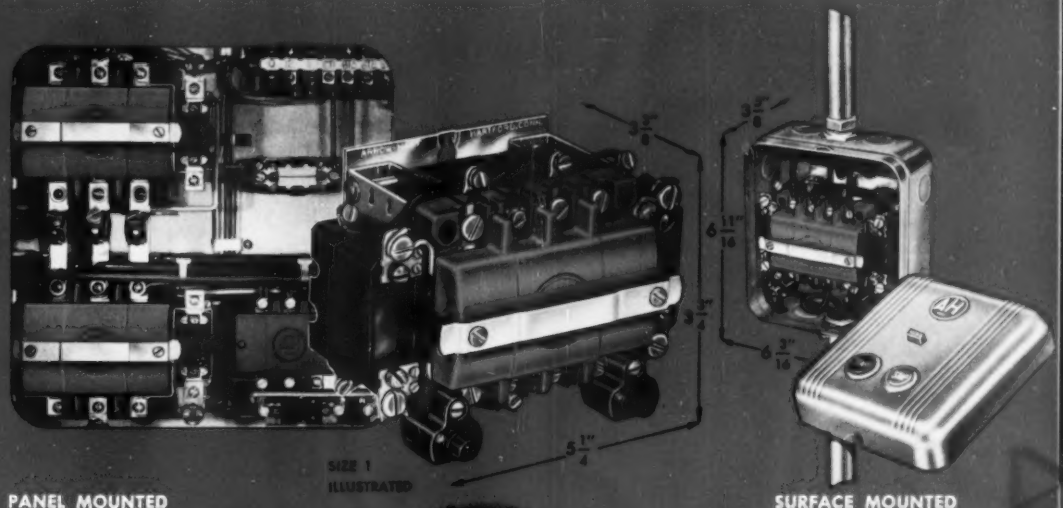
Atomic-Powered Planes Studied by Engine Makers

WASHINGTON—The Air Force and the Atomic Energy Commission have announced that the NEPA Div. of Fairchild Engine & Airplane Corp. has completed its contract for studies in development of a nuclear-powered aircraft.

The NEPA Div. has carried out experimental work at Oak Ridge, Tenn., for over four years as a basis for a number of special reports required by the Air Force, AEC, and Navy Bureau of Aeronautics.

Other AF-AEC projects in the field of nuclear-powered flight will be continued. A group of leading aviation engine manufacturing companies has participated in the research under contracts with Fairchild, including: Allison Division of General Motors; Continental Aviation & Engine Corp.; Fredric Flader,; Inc.; General Electric Co.; Lycoming Div.; Avco Mfg. Corp.; Northrop Aircraft, Inc.; United Aircraft Corp.; Westinghouse Electric Corp.; Wright Aeronautical Corp.

BRING OUT **BUILT-IN PERFORMANCE** OF MOTORS AND MACHINERY



PANEL MOUNTED

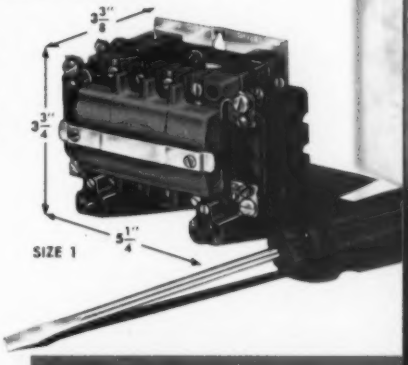
SURFACE MOUNTED

NEW TYPE "RA" MAGNETIC STARTERS

ARROW AH HART

JUST 1/2 THE SPACE

PLUS EASY, LOW COST MAINTENANCE



Arrow-Hart Type "RA" Magnetic Starters and Contactors are designed with easy, low cost maintenance in mind. Because the A-H starter occupies only ½ the space of conventional starters, there's more working room in the box, less space required for control panel layout. Wiring is easier, because it's straight-thru all the way. All terminals and contacts are easy to reach. Terminals are front wired. Line and load wires connect at opposite ends. The switch itself is easily installed with three mounting screws. Contact inspection or replacement is readily made by loosening two hood retaining screws. This ease of wiring and servicing is made possible by the revolutionary "RA" (Right Angle) Balanced Mechanism exclusive in Arrow-Hart starters.

BUY WITH CONFIDENCE *PROFIT BY PERFORMANCE*

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN., U. S. A.

ARROW AH HART

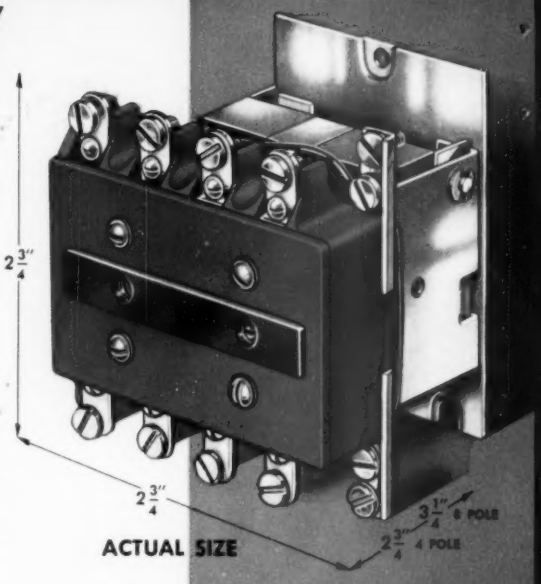
INCHES SMALLER...

EVERY INCH A CHAMPION!

NEW ARROW AH HART SIZE 00

Type "CRA" CONTACTOR

The revolutionary new Arrow-Hart Size 00 Type "CRA" Contactor measures just 2¾" x 2¾" — cuts inches off any other contactor on the market — yet is every inch a champion! Take the design: from Arrow-Hart's exclusive new "RA" (Right Angle) mechanism — the same which enabled A-H engineers to build the compact control package described on the preceding page — to the 00's ***automatic*** positive contact pressure control, this ingenious multi-pole convertible contactor results in big savings of space, work, time, money; assures you unparalleled performance throughout its long life.

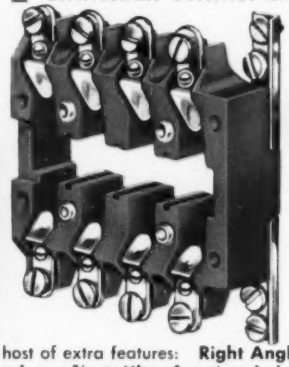


ACTUAL SIZE

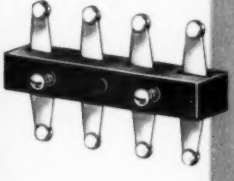
ONLY 4 BASIC SECTIONS

1 COVER PLATE

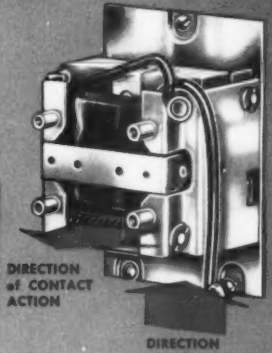
2 STATIONARY CONTACT BASE



3 MOVABLE CONTACT UNIT



4 FRAME with COIL-MAGNET MECHANISM ASSEMBLY



Here are just a few of its host of extra features: **Right Angle mechanism, reducing size by as much as ¾ • Ultra-functional design • Fewer components — reduced handling • No-twist no-rock frame • Compactness within own framework • Unit stability and rigidity • Foolproof, guided assembly throughout • Contacts operate in vertical position • Self-aligning contact action • Unusual ability to handle a multiplicity of circuits • Movable contact carrier • Enclosed contact chambers • All wiring in line and straight-thru • Mat-finished cover plate for terminal markings • and many more.**

Get all the facts about the A-H Size 00 Type "CRA" Contactor, available in 2, 3 and 4 pole types. Send for Engineering Data Folder.

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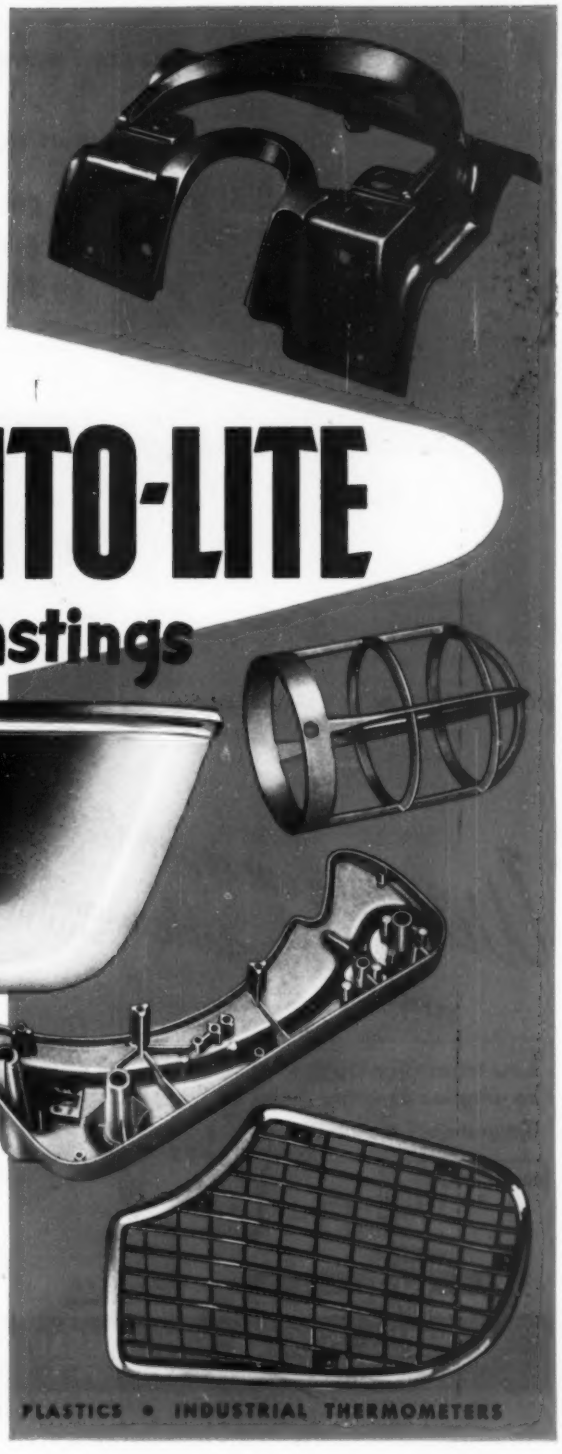

● Many of America's leading manufacturers, producing a wide variety of products, are benefiting from Auto-Lite die cast research, experience and advancement. Such developments as high pressure casting, special alloying practices and improved quality through the "controlled metals process" make Auto-Lite the logical source of supply for precision die castings. Address inquiries to:

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FAST SET-UPS!
FITS ANY PRESS!
FEEDS EVERYTHING!

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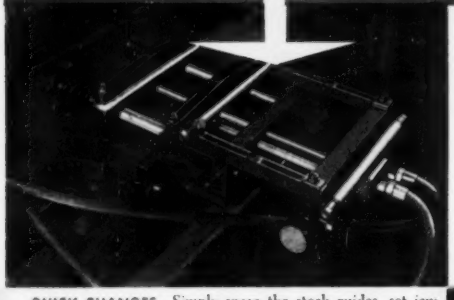
Feedmaster
AUTOMATIC AIR FEED



NO ROLLS -
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Feedmaster depends on nothing but *air* for both feed motion and its powerful grip. Takes no power from press! Positively timed!

QUICK CHANGES—Simply space the stock guides, set jaw clearances and change the stroke by rotating a dial . . . set-ups are that easy!

MAKES MORE PROFIT—No more slow hand-feeding . . . No more wasted time on long, tedious set-ups!

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HANDLES ALL STOCKS—From foil to two by fours! Feeds singly or in multiple.

SAVE 2/3 to 3/4 of cost!

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STANDARD *Adjustable* MULTIPLE SPINDLE DRILL HEADS

Low Prices • Top Quality • These Heads can be adapted on either round or flanged quill machines.

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WRITE TODAY for 1951 Catalog Dept. T

US HEADS SINCE 1915

Also manufacturers of all types of fixed center heads

UNITED STATES DRILL HEAD CO.

CINCINNATI 4, OHIO

The workman who started using the new carbide toolbits should receive an award for the idea. As this idea would eventually be adopted in any case, the suggester should be rewarded in some way. Any suggestion system should work both ways. In the final analysis, we must encourage the desire to suggest or criticize without fear of reprisal.

A. E. Salmons
Philadelphia, Pa.

•

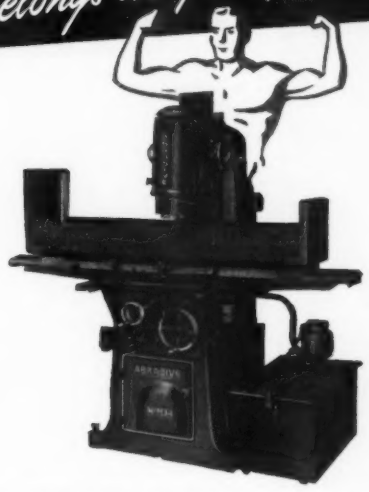
SKILL STEALER

BEFORE taking sides on an issue as this, I would like to make this simple statement. Any workman, regardless of what you call a skill or trade, is working mainly to support his family in the best possible manner and at the same time save a little for a rainy day. In order to do this, first of all he must try to get the most wages possible. Secondly, security or steady work should be his next prerequisite and thirdly, working conditions as to safety, cleanliness and the people who work with him, including his supervisors. These are the basic factors that determine whether or not a man would leave his job to take another.

Let us assume that the wage scales in the designated area, discussed in your article, are similar. That would immediately cross out the first prerequisite. By the same means, let us assume that both firms manufacture similar products; therefore, security would be the same. That brings us to working conditions, which in our present-day manufacturing principles, are more or less governed by the different insurance rulings and state and national commissions.

All this brings us to the point of why leave one job for another. If I were faced with this particular problem with the aforementioned conditions being constant, I would immediately check the personnel records to determine how long these men have worked for us and how long they worked at their previous jobs. If their period of employment has been short in all cases, this would be an indication that they are floaters. If this was true, I doubt that they would be happy on their new jobs and that we would probably gain rather than lose by their quitting. If I found from the reports that they are stable employees, I would immediately check with the remaining men of the department to try to determine their dissatisfaction, if any. I would then concentrate my attention on the supervision and production of the department.

M34 POWER
Belongs in your plant



Abrasive's M34 Surface Grinder puts power where it does the most good — into the grinding wheel. The 6" segmental type grinding wheel is direct driven by a 5 HP, 3450 R.P.M. Pope Motorized Spindle. There are no friction losses due to belting, gearing, chains, or other power-consuming types of drives. For precision grinding of flat dies, washers, punches, spacers, parallels, chasers, raising blocks, etc., you just can't beat the M34.

THERE ARE MANY OTHER IMPORTANT FEATURES OF THE M34 VERTICAL SPINDLE SURFACE GRINDER:

Capacity: 24" x 8" x 12" high.
Automatic down-feed: from quarter of a thousandth to .002" at each table reversal.
Table feeds: power longitudinal feed with hydraulic shock absorber to reduce shock at reversals. Hand transverse feed.
Unit bed construction: Single casting, heavily ribbed for utmost rigidity.
Lubrication: mostly by Bijur One-Shot oiling system.

For complete details, write ABRASIVE MACHINE TOOL CO., 8 Dunellen Road, East Providence 14, Rhode Island.

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ACCURACY BOOSTS PRODUCTION
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Mac-it Hollow Pipe Plugs — for accuracy, safety, uniformity and strength.

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first*.

Mac-it's 38 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

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How to Get Better Bearing Performance

Here are two famous bearing materials that give you superior bearing performance at nominal initial cost. Both are readily available at Ryerson.

Glyco babbitt metal is a lead base alloy with physical properties equal to those of high tin babbitt. Introduced in this country by Ryerson almost 50 years ago, Glyco babbitt is made by an exclusive process which gives the greatest possible homogeniety of texture and unvarying uniformity. It is available in five grades covering all bearing applications—light or heavy shock loads, low or high shaft speeds.

Ryertex is a phenolic laminated-textile composition developed under Ryerson sponsorship. Possessing an extremely low co-efficient of friction, it may be used with practically any lubricant—water, oil or grease, alone or in combination. Adaptable to almost any size or shape, Ryertex bearings are out-lasting and out-performing other types of bearings in many steel and paper mill applications, in the marine field and in other industries.

Write for full details on these money-saving bearing materials.

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I might add in closing that little things in the minds of employees, if ignored, can grow to tremendous proportions.

Lyle Vinger
Waukesha, Wis.

•

ANY PERSON whose skill is above the average is entitled to compensation in proportion to the skill required for the work performed.

Such extra compensation may not be in the amount of salary in all cases (although that is the most common way). It may be in a steady employment through dull times, vacations without loss of pay, insurance, or any one of various ways in which the employee is shown favors which are helpful in keeping the employee satisfied.

No employee is likely to seek a change of employer except as prospects considered from all angles appears to be better with another employer, one of the foremost of these is probably an increase in pay, a better chance for improvement in skill, a more desirable class of work, or some other features too numerous to mention.

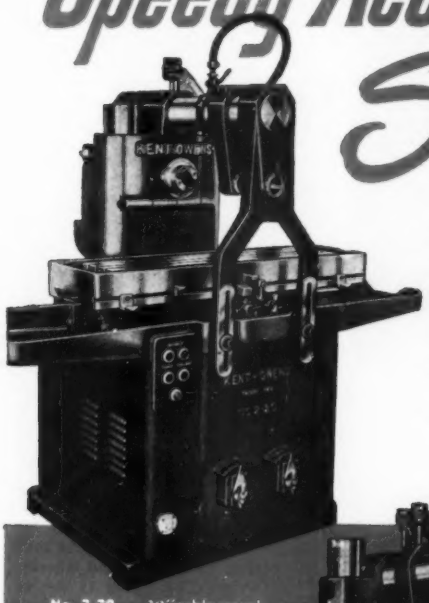
Workers should not be criticised for seeking employment where they can do the best, considering both the pay, and chance of advancement. Among the younger class of employees a feeling frequently exists that a change of employers is desirable from an educational standpoint. An employee risks practically everything when changing jobs, while the employer's risk with only one person is much smaller.

When we purchase tools, we select those that are most efficient for use where they are to be used, with due consideration of their cost, especially those that are not in continuous service. The same general rule applies to those who are to operate tools except that in the latter case we are dealing with human beings who certainly demand deeper consideration.

No employee should give up his job without notice in advance, stating reason for leaving, and long enough in advance that his present employer may have plenty of time to secure someone to replace him The same general reasons should govern the employer when a layoff is required.

Sometimes when an employee leaves a job he is giving up that which is the sole support of a family, however if the employer has reason for him to stay on for a time to assist in breaking in a successor on

Speedy Accurate Milling Saves Labor!



On countless jobs—Kent-Owens Milling Machines have shown ability to turn out work with top speed and high accuracy. They're designed for rapid, easy set-up and operation. Rugged . . . with twin-post head mounting that assures balanced load—no chattering. Practical features throughout to help you *produce more* . . . with *lower costs!* Write for bulletins on the Kent-Owens Standard line . . . including wide range of hydraulic and hand operated machines. Also, let our engineers help you with tooling and special machine requirements.

Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic feed.

No. 2-20 DS . . . Double Spindle for two milling operations . . . 20" table travel . . . 42"x12" table. Hydraulic feed.

No. 2-20V . . . 20" table travel . . . vertical spindle with speed range 32 to 1284 R.P.M. . . . 42"x12" table. Hydraulic feed.

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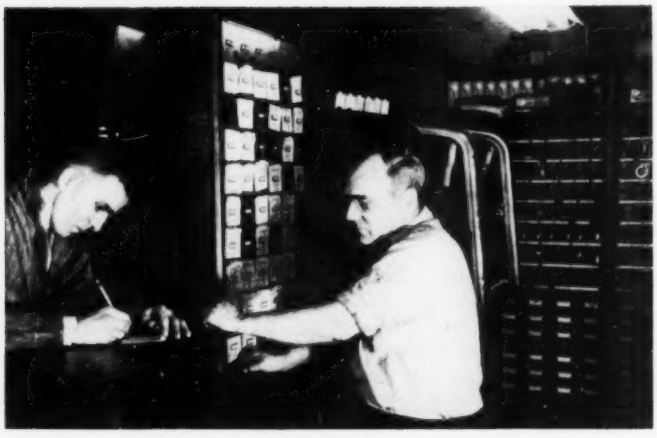
KENT-OWENS

For Milling Machines



Replacing their tool check system paid a big return in Precision Castings Company's die shop in Syracuse, N. Y., proving again that . . .

SMALL SHOPS, TOO, NEED BETTER CONTROL OF TOOLS

"I would use McCaskey Tool Control if I had only 20 men drawing tools."

Mr. Edward Burtt, Precision's Stores Foreman, makes this statement without qualification because of the results he saw from their switch to McCaskey.

A great effort had been made to control tools with their check system, but production delays were frequent and tool expense was high. The picture changed the day McCaskey operation started:

(1) Approximately $2500 worth of end mills alone were recovered from machines, tool boxes and benches.

(2) Numerous other tools also were found.

(3) Monthly tool purchases dropped immediately.

(4) Delays, machine down-time and idle time of operators caused by missing tools were eliminated. They know now what tools they have and where they are.

(5) Crib inventory was reduced through knowing monthly activity of each item.

(6) Tool breakage is being cut by quickly identifying sources of trouble and correcting them.

(7) Crib service is much faster with no increase in personnel.

Let us tell you how similar savings in tools and time can be made in your shop. Mail coupon today for pamphlets giving you all the facts.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

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McCaskey
INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

the job he should if possible do so and the employer should give the one to be laid off notice as much ahead of the layoff as possible.

In fact both parties should part their active relations with one another in a way that both parties may feel free to return if circumstances change to an extent that such a change might be desirable.

H. B. Martin
Watervliet, N. Y.

•

As long as all men are not equal in ability there will be a great deal of personnel shifting from one plant to another, and from one city to another city. It is hardly fair to call this natural movement by such a term as skill stealing.

In any classified section of any paper, anyone can find ads calling for particular types of skill in many trades and professions. Life in the United States is competitive. The president of one company resigns and goes to another company for the purposes of securing greater responsibilities and a larger salary. Mechanics and draftsmen do the same thing, and so do sailors and laborers. This continual changing is the essence of life in our country. We don't eat the same things for every meal, and all of us are not content to stay at the same job all our life. We are continually seeking self improvement, sometimes in wages and sometimes in living or working conditions.

There is nothing Al can do about it—or not too much. He can fight to secure the highest wages for his best men, and go out of his way to make working conditions agreeable to them. Only by these two means can he buck outside competition.

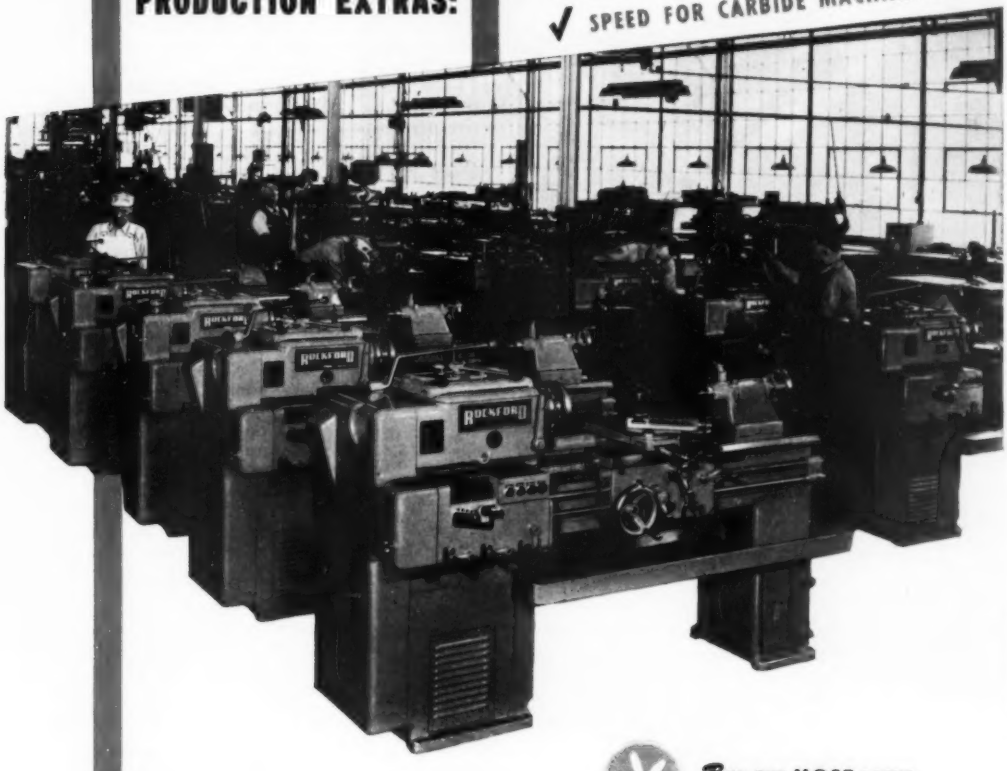
Some years ago in Akron, there was considerable skill stealing among the rubber plants for technicians above the rank of foreman. This practice became so annoying that an agreement was finally reached to the effect that if a technician left one company he would not be hired by any of the other companies for one year. I believe agreements like that are very unfair—if not illegal. The agreement didn't work out as intended and it was finally dropped.

Ball clubs hang onto their players by the use of contracts, agreements and bonuses. Actors, important executives of many lines, and other individuals sell their services through the medium of a contract. But those are the cases of a small group of talented or specially trained individuals.

Employers of large groups of not so highly trained or talented in-

Check THESE PRODUCTION EXTRAS:

- ✓ ALL-GEARED HEAD
- ✓ QUAD-V-BELT MOTOR DRIVE
- ✓ SEPARATE LEAD SCREW, FEED SHAFT
- ✓ SPEED FOR CARBIDE MACHINING



Buy THE MOST LATHE FOR MORE WORK

● These are but a few of the production extras offered on Rockford Economy Lathes — and in a price class usually found only for smaller, lighter tools.

Rockford Lathes have ample reserve to take care of a wide range of straight-production, tool room or maintenance work. Features include 5 H.P. motor, 1-9/16" spindle hole, and quick change gear box providing carriage feeds from .004" to .060" and full range of threads from 4 to 56.

Twelve spindle speeds are easily and quickly selected through convenient shift levers. The spindle and all head shafts run in precision Timken bearings. These features assure capacity for close work, fast set-up, savings in non-productive time, and easier work for the operator.

When you're buying lathes, look for the *most* lathe, to give you *more* work. A Rockford representative can give you this complete story, price and all. Why not call him today and be set for those lathe jobs.

Ask for a copy of our Bulletin 900A.

MEDIUM SIZED
ECONOMY PRICED

ROCKFORD ECONOMY LATHES—16" and 18'

516

ROCKFORD MACHINE TOOL CO. • ROCKFORD, ILLINOIS

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REED

Cylindrical Dies
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For Precision Threading
Knurling — Forming
Burnishing — Serrating

Superior strength is largely responsible for the increased use of rolled threads. The cold forging action of thread rolling produces a thread that is substantially stronger and tougher than similar threads produced by other processes. Improved fatigue strength of 50–75 per cent is commonly reported.

Increases Tensile and Shear Strength
Increases Resistance to Fatigue

As a pioneer in thread rolling, Reed has worked closely with the Air Corps, Army and Navy in engineering the various applications of thread and form rolling. Reed equipment has provided an economical method of producing precision parts at lower manufacturing, assembly and inspection costs.

Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

Manufacturers of
THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS
Worcester 2, Massachusetts, U. S. A.

AM-020

dividuals use pension plans, and various welfare media to keep their own employees loyal and contented. Sometimes these inducements work, but not always—and nothing can be done about it. Prisons and the military services are the only two types of organizations in this country that have the will and the machinery to keep men on their jobs and prevent chanuges, and personnel shifting. I don't believe there are many of us who would like to confer their rights and powers on our industrial bosses.

James K. Matter
Detroit

•

THERE ARE a number of possible factors which have bearing on the degree of offense of which one is guilty when persuading skilled employees to leave their place of employment in favor of another. Granted that most of us (even many of us who sincerely believe ourselves to be unselfish) have an innate regard for our own affairs that leads us into a degree of blindness concerning the rights of other firms and other individuals, it still remains true that there may be extenuating circumstances under which the actual offense in persuading an employee to leave his organization is more apparent than real.

There is an inevitable law of reciprocity operating in the universe. Let us look back to the time when George Ralls entered the employ of the same company with Ed and Al. It could be possible that George well remembers he was persuaded to leave another job at that time, and that after he had made the change, he found the grass was no greener on the other side of the fence. It may be the picture was painted brighter to him than it should have been while he was being persuaded. This fact may have rankled in his breast in some measure since that time, all unknown to anyone else. If we assume this to be the case, it is not at all difficult to see that however the thing may look to Ed or to Al, George feels perfectly justified in persuading men to leave the plant and join him in his new connection, especially if he feels sure that in this case any men making the change will actually benefit by so doing.

But the law of reciprocity swings back and forth like a pendulum. Al will always feel that George has done the wrong thing, and it may easily be that at some future time when George will suppose himself to be sitting pretty, employee-wise, Al may feel perfectly justified in "returning the favor" by persuading

For today's stepped-up production

GET FAST, THOROUGH METAL CLEANING with VAPOR DEGREASING

Removes grease and oil in a minute or less . . . simplifies subsequent handling and finishing of parts

FOR a metal cleaning process that combines high production volume and economical operation with low equipment and space costs . . . consider vapor degreasing.

This modern cleaning method is so simple that an average worker can be trained in a short time. Compact, space-saving equipment can be installed and ready for production without the long periods usually necessary for adjustments and "tune-up."

Vapor degreasing thoroughly cleans grease and oil from metal parts of any size or shape, leaves parts clean, warm and dry—ready for inspection, assembly and further processing. Operating costs are low, too, for solvent consumption is almost independent of the amount of contaminant removed.

Trichlorethylene Degreasing Solvent

Under various trade marks, such as "Triclene" D, Du Pont degreasing solvents have been widely used for many years. These solvents are stable . . . the best yet developed by Du Pont for metal degreasing. They stand up against contaminating and destructive materials which may be introduced in degreasing . . . assist materially in carrying out efficient and economical metal cleaning.

SEND FOR FREE BOOKLETS

In this helpful literature, you will find detailed information on the advantages of vapor degreasing, the equipment used, the Du Pont degreasing solvents, and many industrial applications. Just clip the coupon below!

Tune in Du Pont "Cavalcade of America" Tuesday nights—NBC coast to coast

non-flammable DU PONT SOLVENTS for VAPOR DEGREASING

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Please send me your free literature covering the vapor degreasing process and solvents. We are interested in cleaning _____ products.

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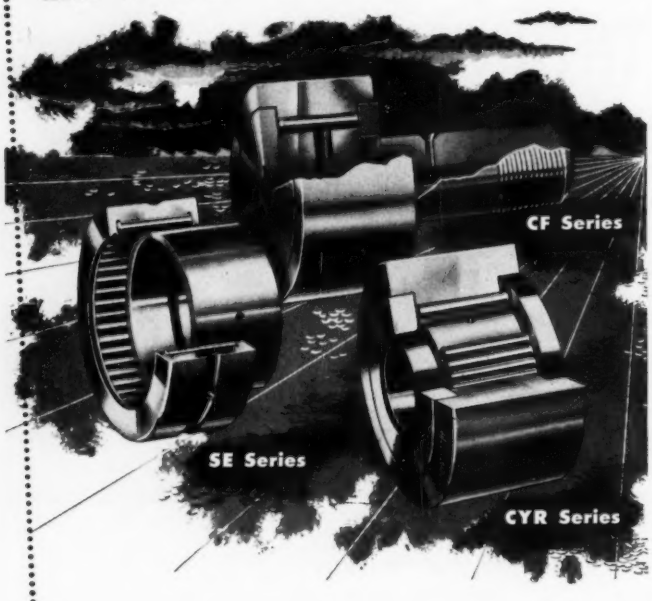
"Longer life and greater efficiency"
with McGILL® MULTIROL® Bearings



Compared with friction hampered plain bearings McGILL MULTIROL full type roller bearings resist wear because of their easily lubricated roller line contact with raceways. Longer life and greater efficiency is the natural result of the constant precision maintained in the bearing. Lubrication is simplified and required much less frequently. Maintenance is free of costly down time for periodical adjustments and bearing replacement. MULTIROL bearings are your assurance of adding these advantages to the operation of your machinery. Millions in service to date prove such exclusive features as one piece outer race and roller retaining end shoulders, and lubrication reservoirs above roller ends in the SE Series. CF and CYR Series have thick outer race sections for heavy shock load in cam action applications. Mounting is possible with or without stud.

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McGILL MANUFACTURING CO., INC. . . . . BEARING DIVISION
111 N. LAFAYETTE ST. . . . . VALPARAISO, INDIANA

McGILL® precision bearings

While there is an inevitable financial loss resulting to any firm losing skilled employees in this manner, and while, through the law of reciprocity, the ultimate end may and probably will be a financial loss to both firms involved, undoubtedly a more serious result is consequent depreciation of good will as between such firms or individuals.

Once one man has been persuaded to leave his organization and to join another, it is often much easier to persuade the next one, due in some measure to a face-saving complex to which most of us are subject. If Wilson has recently gone over to another organization, he soon afterward meets Jones on the street, who previously worked on the press next to his. Under the laws of courtesy and curiosity, Jones will inquire as to how Wilson likes his new job. Under the vain law of face-saving, if under no other, Wilson gives a report which certainly plays up all the advantages of his new job, and forgets the disadvantages. Next lunch hour, Jones confidentially tells the gang that Wilson is really going places on his new job. In this way the mental process begins which ripens additional men for the pick-off.

John E. Hyler
Peoria, Ill.

SAFETY LAST

To MANY workers—too many, in fact—the activities on safety are looked upon as so much wasted time. Any effort which promotes safety is a time saver in the long run and, regardless of the size of the shop, considerable thought should be given to make "safety" the uppermost in the mind of the worker. The promotion of safety is something in which there should be no let down; it has to be hammered in at all times either by posters or word of mouth. These have their limitations in themselves and it must be brought to the worker's attention that disregarding safety measures is not to be tolerated. The relaxing of effort soon results in the worker reverting to his old careless habits wherein he chooses to take dangerous chances.

In taking on a new employee he should be given a thorough going over and impressed with the seriousness of time-consuming accidents; he should be made to understand that the success of the whole group is dependent upon the conscientious cooperation of every one of the workers.

When we look back over the

"No more staining of brass and aluminum since we switched to

Gulf Stainless Cutting Oil,"

says this machine shop foreman

"Before we switched to Gulf Stainless Cutting Oil, staining of brass and aluminum parts was a problem in our shop," says this Machine Shop Foreman. "It became necessary to dip these parts in Stoddard Solvent to remove the corrosive cutting oil. With Gulf Stainless Cutting Oil we've been able to eliminate this operation—and we get no more staining. The result—lower costs, increased production!"

This is one of scores of shops that have improved production and reduced costs through the use of Gulf Stainless Cutting Oil on certain types of jobs. In addition to its outstanding performance as a cutting fluid, Gulf Stainless Cutting Oil also provides adequate lubrication for the working parts of machine tools. Thus it is ideal for machines using one oil as both lubricant and cutting fluid. Another important advantage: it is noncorrosive to bronze machine parts.

Ask a Gulf Lubrication Engineer to demonstrate the advantages of Gulf Stainless Cutting Oil and other quality cutting oils from the complete Gulf line in your shop. Write, wire, or phone your nearest Gulf office today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

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1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

4 things to look for when you need a new black-and-white print machine

NO EXHAUST DUCTS. Bruning BW machines do not use a vapor developer nor emit fumes, thus they need no exhaust ducts. You merely roll them on their casters to wherever they are needed, connect them to your electric circuit and they are ready to make prints.

LESS MAINTENANCE. Craftsmanship and top-quality materials mark every Bruning machine, and pay off in reduced maintenance. All essential bearings are self-aligning permanently lubricated ball-bearings, and bearing shafts are ground to a .0002" tolerance. The adjustable speed drive is a simple, foolproof, patented transmission that runs for years without attention. Welded torque tube braces provide rigidity, assuring exact roller alignment despite uneven floors. Every part requiring servicing is accessible in minutes.

FLEXIBILITY. Bruning machines can handle *any* black-and-white print job. The *unrivalled* variety of Bruning sensitized papers, acetates, films and cloths assures you of complete flexibility. Six different BW machines offer a complete range of speeds and capacities for your every requirement.

COPYING "KNOW HOW" Specialists in copying since 1897, Bruning introduced the black-and-white print to this country in 1929. We manufacture 85 varieties of sensitized papers, films and cloths—far more than any other supplier, and our four coating plants are strategically located to guarantee fresh materials to all sections of the country. Servicing facilities and distribution are nationwide.

See for yourself why Bruning BW copying machines are best. The coupon will provide you with a demonstration or explanatory booklet without obligation. *Send it today.*

BRUNING

Specialists in copying since 1897.

CHARLES BRUNING COMPANY, INC.

Dept. A-31 100 Reade St. New York 13, N. Y.

☐ Please send me information on Bruning BW machines.

☐ I would like to see a Bruning BW machine demonstrated.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

Eliminate print overloads. Modern Bruning machines like this Model 93 can produce up to 105 square feet of perfect prints per minute.

changing years and see the result of "safety" activities the effectiveness of the effort is very obvious. While safety campaigns, programs, and what not, run into money, it is nothing compared with what the cost would be without them. Most accidents are the result of carelessness of individuals who choose to take chances or are ignorant of the dangers involved in doing a certain operation. Ofttimes mishaps will occur in spite of a worker's efforts to abide by the rules.

On my left hand I have three prominent scars which are the result of not thinking through the consequences of carelessness. Fortunately I have been spared serious trouble on account of my aversion to wearing goggles while working at the grinder. When I think about the number of times that I have "dug" particles of emery from my peepers I shudder—a white cane could have been my lot very easily on account of my bull-headedness.

A man's eagerness to get a job done will often result in a painful accident. A shopmate of mine some years back was asked to rush out a steel bevel gear blank and had ploughed through the piece of tough steel with a 1½-in. drill. When he withdrew the drill from the piece it was sizzling the cutting oil he poured on it. He rushed up to exchange the drill for a 1 9/16-in. reamer and before he got to the tool crib he thought he'd kill two birds while up at that end of the shop and stepped into the relaxing chamber.

Beside the latrine was a small window, head high, through which the contemplator could gaze all the while. As friend Joe held the shank of the smoking drill in his left hand, somehow or other the unaccountable antics of attractive forces went to

"Er-r-r...those are my secretary's fingernails"

ROTOR TOOLS "PAID OFF" IN 30 DAYS!

A MANUFACTURER of impellers found grinding in corners and around curves a tough, time-taking job. Then the Rotor Application Engineer gave his recommendations.

Straight wheel and cone grinders were replaced with Rotor Air Verticals that use 9-inch flexible sanding pads. This eliminated all wheel marks, made it possible to get into those curves and corners, and use the same type grinder for all operations.

The result—a 21% reduction in grinding time. Thus the Rotor tools paid off their cost in less than 30 days. Production quality is better too.

Want to get similar benefits in your grinding operations? Call in the Rotor Application Engineer, or write for Catalog 35.

AIR O'TOOL

ABRASIVE EXPERT helps customers at one of the new 3M Demonstration Rooms.

Grinding problems? Bring them to a 3M Demonstration Room!

Grinding costs too high, production too slow? You can get fast, *expert* help at the nearest 3M Demonstration Room, staffed with 3M Methods Engineers.

Skilled operators will grind samples from your production line, work out new methods and recommend the type of coated abrasive that's best, most economical for the particular job.

Come in anytime with any kind of problem—from heavy grinding to fine finishing. Chances are we can assist you. 3M Demonstration Rooms: Boston, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, Los Angeles, New York, Philadelphia, St. Louis, St. Paul, San Francisco, and Seattle. Send the coupon below for further information.

Minnesota Mining & Mfg. Co., Dept. AM351
St. Paul 6, Minn.

☐ Please have a 3M Methods Engineer call.

☐ Please send copy of new "Step Up Production" booklet explaining the 3M Method of Grinding and Finishing.

3M ABRASIVE BELTS

Name.....

Firm.....

Address.....

City.....Zone.....State.....

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N. Y. In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

work while he took in the activities in a neighboring flat. The yell let out by the poor fellow could be heard throughout the shop and what he said wasn't very nice! Joe walked bowlegged for a couple of weeks after that experience and vowed never to mix business with pleasure from then on. It only goes to show that the advocates of Safety First can go too far—in neglecting to stress safety in some of the damnedest places.

J. Homewood
Ontario, Calif.

•

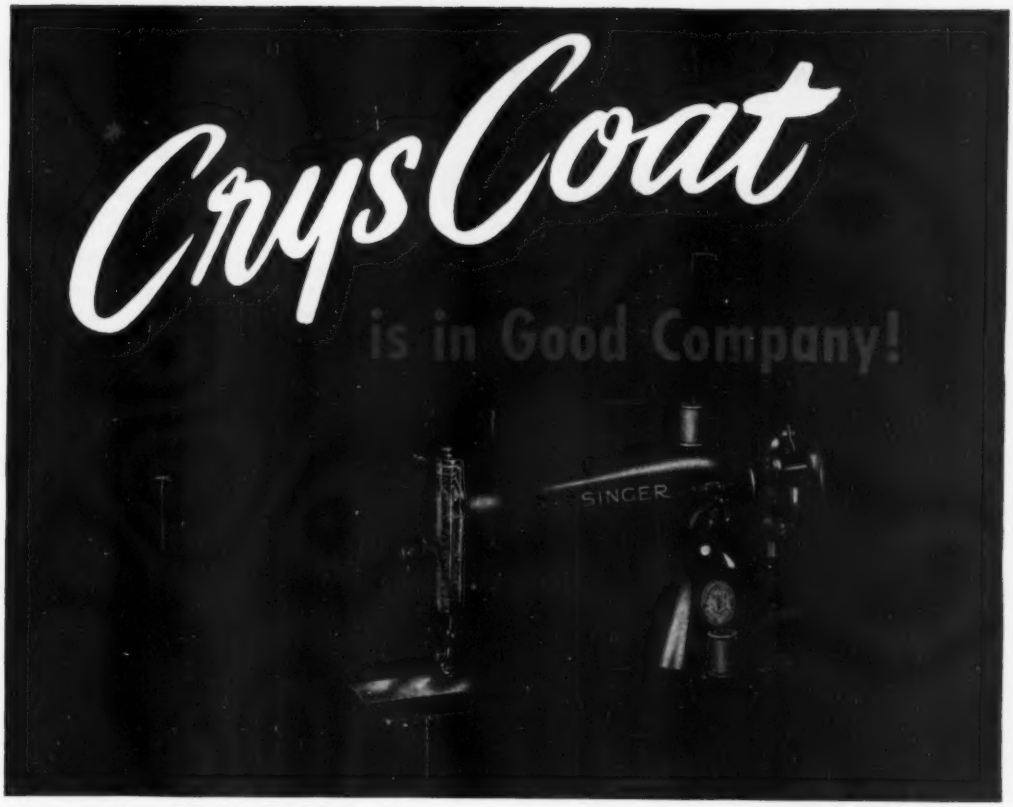
To WAKE people up so they see and hear about safety is not a job that can be done overnight. It takes time and planning and campaigning all the time.

There are many ways to go about it. We in our plant are doing everything possible to make the men safety-minded. We started with the supervisory force. First we created a safety committee and trained the safety committee in a school, then the safety committee held courses in safety with the supervisory force. The courses were divided into ten lessons, each with not more than 40 people.

A movie was shown each time showing some hazardous spots in an every-day shop and the highlights of the picture was given on a mimeographed sheet. With 20 items, the safety man started the ball rolling by asking a question. How did you like the picture? What did you find it of interest? Does anyone in this room have any of the hazards as in the picture? Some one will generally answer that he has. Then the safety man will ask what did he do to correct it. Then others showed how it could be done better. That way the man in the class started to get safety minded.

We have special lighted cabinets throughout the shop where we have safety posters that we change regularly. The foreman makes sure that the men see them and gives them a lecture on the safety angle, showing them that men that have too many accidents are a hazard to themselves and to their fellow employees. When a poster is put on let's say that shows how to lift, not with the back but with the knees, the foreman gets a casting from the floor and asks the men to lift it and then the other men gathered around have to make corrections if the lifter was not doing it right. Therefore all of them are benefiting by it.

Now about horseplay in the shop. If I see one throwing something at



*Prepares Metal Surfaces for Painting

*Patented Material and Process

THE name SINGER† stands for fine sewing machine efficiency, design and workmanship. Oakite is justly proud of the important part the Oakite *CrysCoat* Process plays in assuring fine, durable paint adhesion and corrosion resistance for the many models of SINGER Electric Sewing Machine Heads.

The Oakite *CrysCoat* Process may be just what you're looking for. With minimum equipment . . . in minimum time . . . at minimum cost you can (1) clean metal surfaces and condition them for painting; (2) improve the adhesion of paint to metal; (3) prevent corrosion before metal is painted; (4) localize corrosion under paint if finish is broken.

The Oakite *CrysCoat* Process Offers These Extras:

1. **Eliminates operations . . . uses less equipment**
2. **Cuts operating time**
3. **Uses less chemicals for cleaning and conditioning**
4. **Reduces heating costs**
5. **Saves cost of expensive acid-proof tanks and equipment**
6. **Saves cost of frequent descaling and desludging**
7. **Drag-out costs are less because of low original cost of solution**
8. **Saves paint**
9. **Cuts cost of rejects caused by rusting before painting**

FREE . . . illustrated folder describes the Oakite *CrysCoat* Process for use in before-paint-treatment of steel, aluminum sheet and castings, zinc die castings and galvanized surfaces. If you are engaged in the fabrication of civilian goods or the speedy production of defense orders—send for Folder F7642.

OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

†A Trademark of the Singer Mfg. Co.

SHELDON
CHICAGO

12" Back-Geared Shaper

Big Shaper Performance
Small Shaper Price

The SHELDON 12" Back-Geared Shaper is neither too big, nor too small. It is just right for most shaper work in most tool rooms and shops.

In weight, design features, capacity and performance, it is a "big shaper." In price, operating cost and floor space, it resembles a "small shaper." It is the logical 1st shaper for the small shop and a cost-cutting tool in multiple installations in large plants.

Write for Catalog that shows, describes and gives specification of this shaper and its available accessories.

SHELDON MACHINE CO., Inc., 4234 N. Knox Avenue, Chicago 41, Illinois

the other fellow I generally call the fellow in and other men that are near and I ask the man if he would like me to throw the thing at him, with him staying in a certain position. I aim for his eye but I don't throw the missile, he generally ducks.

Then I say to them, "You see what can happen from horseplay? If you (to the man that was throwing) would have struck him in the eye and he should have lost an eye, how would you feel about it? So you see it does not pay to take chances with safety. If a man is hurt he suffers pain and many times loss of time, especially loss of an eye. You only have two, you know, and a glass eye may look good but you can't see with it."

Now if a man grinds without goggles I generally come up to him and ask him if he wants me to be his manager. He should step in to my office and I will fit him up with dark glasses and I also have a tin cup that he can use. I ask him if he plays any musical instrument as it helps to beg when playing an instrument, then I point out some of the men that were recently out with eye injuries, how they felt, the pain, the suffering they gave to their families. Believe you me it works.

We have the men to bring safety slogans, we have large letters cut out of fiber and we string them up and hang them in the middle of the shop so everybody can see them, and the name of the man who submitted the slogan is also on the sign. It gives them recognition and they think about safety. The present slogan that we have hanging is, "Enjoy Yourself, It's Safer When You Think." We have our accident rate reduced last year. Now we are trying to do better.

You can have no letdown, you must always keep after the men to think before doing anything. It takes only a few seconds to think before doing a job the right way.

Michael Axler
New York

•

I WOULD like to offer some suggestions to make machine-shop workers conscious of safety and safety equipment. But I don't believe the problem has a quick or easy solution and calls for a constant pressure.

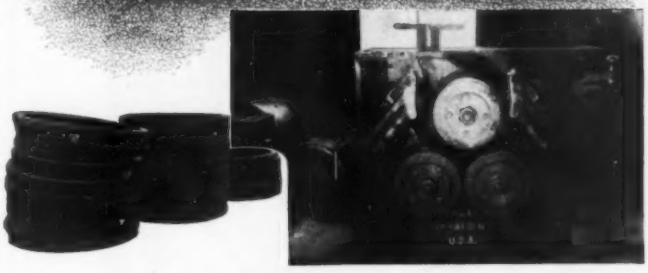
In the first place, men who are ill, who have a "hangover," or even feel "underpar" should not be allowed to work where the job has an element of danger. This belief is based on what happened to me in

INFORMATION WANTED . . .

The Advertising Research Foundation's first readership study of a metalworking magazine reveals that *American Machinist* readers want and seek information on the new machinery, equipment, materials, and other products that can help them do a better production job.

The New Shop Equipment, Materials, and Parts Department . . . devoted entirely to illustrations and descriptions of new products available . . . received higher readership and attention (72 per cent) than any other editorial item surveyed in the March 6, 1950 issue . . . strong evidence that *American Machinist* is a good place to do business with America's biggest industry.

THE PORTLAND COMPANY ROLLS OUT THE *Rush Jobs*



. . . and rolls 'em out accurately with this "Buffalo" BENDING ROLL

The Portland Company, Boilermakers, Machinists and Founders, Portland, Me., has a reputation for prompt, accurate work. One reason is this "Buffalo" No. 1 Vertical Roll. "All in a day's work" recently was an order for 94 rings of 36½" outside diameter, rolled leg-in from 2" x 2" x ¼" angle. Top photo is a partial group of the rings, completed on time, as usual.
If you bend angles, tees, flats, pipe, channels and other structurals into curved shapes, you're always money and time ahead with a "Buffalo" Bender. Rolls are changed quickly for different jobs, and one man can easily produce his payload and then some. If you're looking for lower metal bending costs, write for Bulletins 352-B and 344-A for all information.

BUFFALO "Buffalo" FORGE COMPANY
509 Broadway Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

STOP THAT WASTE!

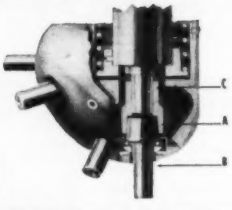
Stop throwing away steel parts and tools found to have a soft skin. Heat-treatment can restore their decarburized surfaces to their original carbon content. It is not a difficult control problem . . . the dewpoint of the atmosphere generated for the furnace is the key to successful operation.

The *American Machinist* Special Editorial Report, "Carbon Restoration Overcomes 'Soft Skin' On Parts," contains a chart to guide you in this cost-saving operation. Reprints of this cost-conscious report are available for only 15 cents a copy. Write Reader Service Department:

American Machinist
McGraw-Hill Building New York 18, N. Y.

MORE HOLES
PER HOUR — PER DOLLAR

Increase production of any standard drilling machine by adding a Lign-o-matic, the *only* drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

PROVED PRODUCTION INCREASE — Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

VERSATILITY — Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to ½" diameter in any material.

PRECISION — Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

GUARANTEE — May be returned in 10 days for any reason for full refund of purchase price. Two-year guarantee against defective parts.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper $235.00
Chucks extra at established prices.

DELIVERY — Currently, 2 weeks.

☐ Please rush ..... Lign-o-matic turrets for
(drill press make) ..... (size) .....
(quill dia.) ..... (spindle taper) .....
My name .....
Title .....
☐ Please send literature on Lign-o-matic turret.
(Attach coupon to company letterhead)

HOWE & FANT, INC.
522 FLAXHILL RD., SO. NORWALK, CONN.

a local factory some time ago. This certain morning I was working at an engine lathe while in back of me someone who was half asleep, or "indisposed," was polishing a steel bar about 18 in. long in a speed lathe. Evidently the operator hadn't tightened the chuck enough as the bar flew out while turning in the lathe, missed the operator, and hit me in the legs, disabling me temporarily. I felt good before but not so good after the accident, and my viewpoint towards safety was altered somewhat.

Someone could be given the job of making each employee conscious of his individual importance to the shop so that they will use safety equipment. In a small shop this is not so important as in a larger shop where the loss of the work of one man is not felt so much. Also in a large shop some of the men might assume the attitude that "it can't happen to me" and get careless.

In smaller shops the subconscious fear of being called "childish" isn't so prominent as in the larger shops, especially where safety precautions might slow up work. To counteract this, bulletins on safety should bring out the fact that safety is mature judgment.

Finally where safety is sincerely desired such rules as the following should be fixed as a matter of company policy.

1. Better safe than sorry.
2. Feel right, work right.
3. Safety is not "kid stuff."

Edward Diskavich
Torrington, Conn.

•

As a member of the supervisors' safety committee at our plant I know the fine results that can be obtained. We also have a safety committee made up of one man from each department. Both groups work together for the safety of all the workers. In the workers group each member serves six months. After serving six months they are placed on the reserve list but encouraged to keep their interest in safety by reporting any hazards to committee. In this way we have a greater number of workers participating which creates more interest.

During the period Jan. 5, 1947, to Oct. 27, 1948, we operated a total of 3,226,920 hours without a lost-time accident. This was a new national record for foundry with machine shop. During this period we employed a monthly average of 825 workers. Eventually every employee will have the opportunity to participate and serve on safety commit-

Showing operator punching holes in a part with the Wales "Quick-Change" Holder.

How the WALES SHEET METAL Fabricator

- ✔ PUNCHES
- ✔ NOTCHES
- ✔ NIBBLES

Faster

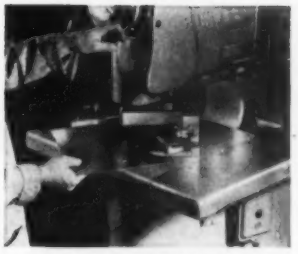
Rapid interchangeability for punching, notching and nibbling is one of the outstanding features of the Wales Fabricator that produce such astounding time studies on limited production runs as shown below. Work from blueprints or operation sheets . . . NO TEMPLATES REQUIRED.

For punching, the Wales "Quick Change" Holder permits the interchanging of punches and dies for various round and shaped hole diameters in a matter of seconds. The holder automatically aligns punches and dies.

Wales exclusive Hydra-New-Matic Drive is unique in its simplicity of design and operation . . . so unique, in fact, that vibration and noise are practically eliminated at 165 strokes a minute.

It's too BIG a story to tell on this page, so write for fully-illustrated, functionally-colored Catalog 10-A and discover for yourself why production schedules of this Wales Fabricator have been more than tripled in the last six months.

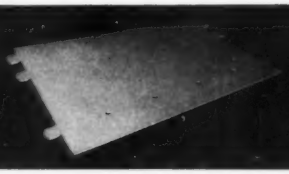
WALES-STRIPPIT CORPORATION
GEORGE F. WALES, *Chairman*
373 **PAYNE AVE., NORTH TONAWANDA, N. Y.**
(Between Buffalo and Niagara Falls)
WALES-STRIPPIT OF CANADA, LTD., HAMILTON, ONTARIO
Specialists in Punching and Notching Equipment



Illustrating a Wales Type "NG" Notching Unit in operation in the Wales Fabricator. Note notched corner in the work.

Showing the Wales Fabricator nibbling around the outside of the guide plate. Inside nibbling is accomplished in the same manner.

Can you match this Time Study?



This part, 22¼ x 9½, with 4 holes punched and 2 sides notched and nibbled including set-up was produced in only 6.1 minutes and subsequent pieces in only 1.2 minutes

HAMILTON No. 1 PRECISION GEAR HOBBER

(Capacity:—6" diameter of gear blank)

Install a Hamilton No. 1 Precision Gear Hobber and make your choice:—the same hourly production as formerly with far more precision, or the same precision as formerly with greatly increased production.

Ask for Bulletin H-1-49

A few DEALERSHIPS are still available.

THE Hamilton TOOL COMPANY

830 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

tee. Individual workers who had previous bad records in safety were soon elected on the committee. They not only improved their own records but made very good safety workers. Many of our departments have now had perfect records for over seven years. Certificates of merit are presented to the departments having the best records. This keeps spirit alive in safety activities.

If there is any one secret of our success it has been the desire of the management and its supervisors to recognize each employee's right to be a part of the safety plans. By making each employee feel he belongs to the safety functions he is happy and eager to help.

A. E. Salmons
Philadelphia

•

SORCERER'S APPRENTICES

I remember one foreman—not the only one—to whom an apprentice was just an offense—a blot on the landscape. There was, nominally, a training scheme for apprentices, for the progress and conduct of whom periodical reports were sent to the superintendent of apprentices.

This foreman was illiterate, and cunning rather than intelligent, and his reports represented his prejudices rather than the facts. So much was this so that the writer arranged that the reports should be sent through his office, for checking. He was surprised at the contents of some of these and felt that they justified inquiry.

He found the foreman's outlook was wrong; apprentices were treated more as backward men who ought to know without being shown, rather than as boys who had learned the three Rs at day school and had gone up into the industrial division where they had to start an entirely new course. How could they know what to do unless they were shown, and shown sympathetically, not cursed. As well put little boys in a schoolroom and say: "There are the alphabet, blackboards, slates, books and pencils; now learn and educate yourselves. If you do not, you will be damned; and if you do, then you will be sent into another school where you will most likely be damned again." What a forlorn hope, and how absurd.

An incident regarding one of this foreman's apprentices may help:

One day an apprentice was found idling on a landing facing the river. When questioned he said, by no means saucily, that he did not know how to do his job; he had spoiled every piece he had set up and he

IT MAKES A DIFFERENCE WHETHER : THE MAN OR THE MACHINE IS BUSY

a BUSY man at an IDLE automatic spells LOSS

an IDLE man at a BUSY automatic spells PROFIT

H & G INSERT CHASER DIE HEADS

are mechanically right, functioning flawlessly at high speeds for hours on end. They minimize down time, gaining as much as an hour a day in net production.

There's nothing like a demonstration to convince the man who must be shown.

Check and Mail for Free Copy

☐ "Selecting Proper Die Head for the Job"

☐ Style MM ☐ Style DMS ☐ Style DM ☐ Style TM

THE EASTERN MACHINE SCREW CORP.

Manufacturers of H & G General Purpose Die Heads, Insert Chaser Die Heads, Threading Machines

20-40 BARCLAY STREET NEW HAVEN 6, CONNECTICUT

SPECIAL NOTICE TO FORMICA CUSTOMERS

Formica's complete fabricating facilities – including punching, turning, milling, routing, drilling, threading and special machining – are available for the production of your laminated plastic parts. This specialized Formica service will save you time and money, and will free your machine shop for other work.

Formica's machine shop is equipped to do the job fast and economically – but above all, it must be *accurate* or it doesn't get past our inspectors.

If you use Formica laminated plastics, be sure to get the additional benefit of Formica's fabricating service. For complete information, send today for new catalog . . . use coupon below.

THE FORMICA COMPANY
4686 Spring Grove Ave., Cinti 32, O.

Productive FORMICA at Work in Industry

Gentlemen:
Send me complete information on Formica and Formica's fabricating facilities.

NAME _____

COMPANY _____ TITLE _____

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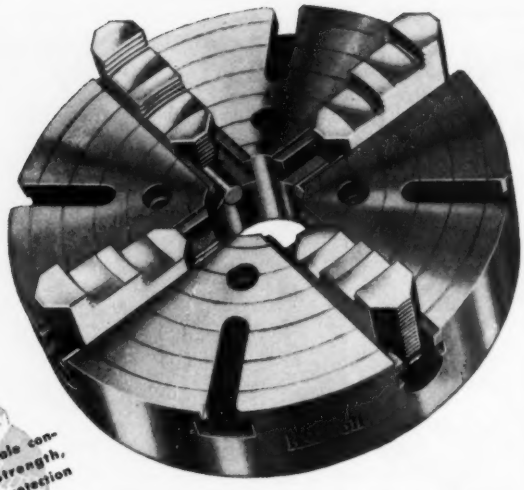


Exclusive pilot hole construction for strength, accuracy and protection from wear.

Chrome nickel steel scroll machined after hardening to Rockwell "C" 40-45.

Exclusive replaceable pinion bushings to reduce scroll and pinion wear.

Flame-hardened* jaw ways to prolong accuracy and gripping power.

One-piece body of forged steel for extra strength and longer chuck life.

Get these EXTRAS at no extra cost

Costlier construction features have given Horton Chucks their reputation for being *"built up to a standard — not down to a price"*. Yet *they cost no more.* Yes, it's true. The extras that Horton builds into every chuck mean greater accuracy, longer life and far better chuck value. Compare a Horton. Try a Horton — and you'll agree.

Write for literature and prices.

*at slight extra cost

HORTON CHUCKS 1851 1951 100th Anniversary

INDEPENDENT CHUCKS
SCROLL UNIVERSAL CHUCKS
SCROLL COMBINATION CHUCKS
TWO JAW LATHE CHUCKS
FACE PLATE AND BORING MILL JAWS

THE E. HORTON & SON CO.
Windsor Locks, Conn.

THE OLDEST CHUCK MANUFACTURER IN THE WORLD

thought it would be better not to do anything—he would not be making scrap. He had asked his foreman and got no help. I inquired as to the job, knew its difficulties, told him what to do and a few hours later found the boy on top of the world, whistling merrily, his lathe running with a piece correctly set. He had become undamned.

You cannot afford not to train and teach your apprentices, your future workmen, but to do so, training scheme or not, needs sympathy rather than antipathy; kindness rather than curses; they are but learning their industrial alphabets.

P. E. James
Lindum, England

•

SQUEAL OR SQUIRM

IF RILEY is bucking the firm by slowing down in his production, it would be best, for Al, to have a quiet talk with him and explain, in a decent manner, how he is blocking the work and that more will be required of him than he is now turning out.

An old foreman once said: "There are three ways of getting work out of a man. The first and best way is to jolly it out of him; the second way is to drive it out of him, while the third way is to scare it out of him. This last is to be tried only in hard cases."

There's the story about a foundry in Scotland where Wally was the foreman and Sandy was a molder.

Sandy's rate was twelve molds per day. One day, Sandy was having trouble keeping his pipe lighted, so he made only eleven molds.

Wally saw Sandy at quitting time and said something like this: "Sandy, ye only put up eleven molds today."

"Aye," replied Sandy.

"Well, now, by workin' hard, ye made quite a bit of smoke, didn't ye?"

"Aye," slowly answered Sandy.

"Sandy, ye know that where there's smoke, there must be some fire."

"Aye," was Sandy's reply.

"Seein' as how it was so much smoke and fire, I'll fire ye."

That probably occurred back in the days when men worked more hours than we like to think about in these days, but it shows that, even at that time, a day's task had been established, so in the case of Riley, there should be a rate, conservatively set, for him to adhere to.

There have been foremen who have had their stooges who were working in their departments, but

FREE-MACHINING

Enduro®

GETS THE "BUGS" OUT OF STAINLESS MACHINING

● Resistance to abrasion and corrosion . . . high strength . . . durability . . . these are the material qualities demanded for pump valves and pressure regulators—strategic units in high pressure sprayers for plant disease and insect control.

In addition, considerable precise machining is required to fit valve ball and seat in an air-tight seal.

The material choice to meet all these requirements: ENDURO Stainless Steel in Free-Machining Grades.

Products of Republic's Union Drawn Steel Division, Free-Machining ENDURO Cold Finished bars offer maximum production without sacrifice of stainless steel's high physical and chemical properties. They give you fine surface finish, close tolerances, accuracy of section, uniform soundness and UNIFORM HIGH MACHINABILITY. Two grades, for example, are 90% as machinable as regular Bessemer screw stock.

Republic metallurgists and machining experts are ready to give you prompt assistance in determining where and how you can use Free-Machining ENDURO Cold Finished Bars to get the "bugs" out of your stainless steel machining. Write:

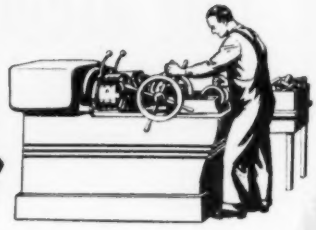
REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic ENDURO® FREE-MACHINING STAINLESS STEEL

REPUBLIC STEEL

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

TIPS ON TAPPING AND THREADING TROUBLES



Page A-6

DATA

OILS FOR TAPPING AND THREADING

OILS WITH ACTIVE SULPHUR REQUIRED

Tapping and threading are difficult machining operations due primarily to limited chip room and the difficulty of maintaining sufficient lubrication at points of contact between threading tool and workpiece. Cutting oils having high sulphur activity are usually required and recommended for difficult threading and tapping work. Stuart's THREDKUT and related products, due to their high effective sulphur content, have been outstanding for this class of work. Active or effective sulphur in an oil functions as an anti-weld agent preventing pick-up of metal particles on the tool which results in scuffing and poor finishes.

RULE OF THUMB

Here is a good rule of thumb to remember when sulphurized cutting oils are being used:
When you observe excessive wear on the front clearance of cutting tools, DECREASE the amount of active sulphur in the oil by diluting with paraffin oil or other low cost blending oil.
If poor finish is encountered due to welding or metal pick-up on the tool edge, INCREASE the active sulphur, or if Stuart's THREDKUT is being used, apply it straight.

RESULTS

Operation: Threading male pipe union sections on large automatics using single point tools.
Material: Type 310 stainless steel.

Oil:	Previous Oil	Stuart's THREDKUT 9961
Tool Life:	136 pcs. per tool grind	310 pcs. per tool grind
Part Finish:	Fair	Excellent
Cutting Fluid Costs on Machine:	$0.47 per gallon	$0.44 per gallon

Write for Literature and ask to have a Stuart Representative call

D.A. Stuart Oil Co.

2729 S. Troy Street, Chicago 23, Ill.

if this ever worked out successfully, it would be a pleasure to know about it. Such relations are bound, in time, to leak out, partly because the foreman or the stooge lacks the proper discretion and tact or some man finds a clue to the true situation.

Take a case where the foreman and the stooge quarreled. Apparently over the work, then settled their differences and the stooge called on the foreman from time to time at his home during the evening.

This relation went on for some months; the men often wondering how the firm learned many things, though the actions of the foreman and the stooge were observed. Then, one evening, the stooge was seen entering the home of the foreman at a late hour. At once he became the scum of the earth to the other men in the department and they made it so hot for the stooge that he finally quit. He was a good man at his trade, but he was considered to be a sneak.

A matter of observation is that where stooges are placed in a department, the labor turnover is greater for the foreman may have a tendency to quarrel with the other men and they will not stand for it. Again, the foreman may try to rub the fur the right way and does so too strongly, so the men find that out too.

An old foreman, who knew his work and could impart his knowledge to others, once boasted that he had never fired a man, but there was a good reason for it. Men would come to him, in an almost fighting mood but he would calm them down, until after a few words, he would reason things out in such a way that

"Your diet's coming along beautifully, Myrtle."

1/3 Billion Pieces

. . . CLUTCH EXPENSE $0.00

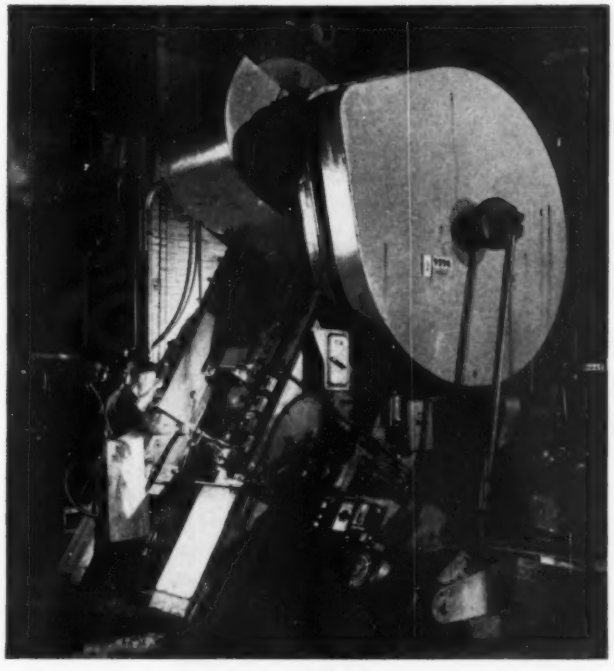
MINSTER Press Performance Report

No. 40E-9-3782

- 400 tons
- Single Crank Straight Side Press
- Single geared
- Stroke, 5"
- Strokes per minute, 33
- Bed area, 48" x 39"
- Permanently inclined
- Equipped with Minster air-operated combination friction clutch and brake unit

Below . . . Minster Press No. 40E-9-3782 on day of shipment 1943. Flywheel and drive shaft run on Timken tapered roller bearings.

Right . . . Same press today. Used to blank and draw roller bearing cage cups out of high carbon steel strip. *Photo courtesy The Timken Roller Bearing Company, Canton, Ohio.*



Minster Press at The Timken Roller Bearing Company produces 349,440,000 pieces, 1/3 operations single stroke . . . runs 29,120 production hours . . . WITH NO DOWNTIME, LABOR OR PARTS COST DUE TO CLUTCH REPAIRS.

Why is it that this remarkable clutch record at The Timken Roller Bearing Company really isn't so remarkable . . . for a Minster press?

Why is it our files are loaded with clutch performance records of 8 . . . 10 . . . 14 years with repair costs nonexistant or extremely low?

Why is it that the press clutch . . . often a source of expense and irritation . . . is in the case of Minster something that can almost be ignored year after year?

The answer lies in design superiority, producing not only low maintenance costs but higher speeds . . . longer die life . . . greater accuracy . . . unusual versatility. In fact, Minster today is accomplishing results once thought impossible to obtain with a power press.

Have the many advantages of Minster presses and Minster's Air-operated Combination Friction Clutch and Brake Unit been explained to you recently? Tremendous strides have been made that will make it worth your time to write, wire, or telephone.

MINSTER

FIRST IN *Press* DESIGN

THE MINSTER MACHINE COMPANY, MINSTER, OHIO

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Also American Pattern Files, Milled Curved Tooth Files, Rotary Files, and Mechanics' Hand Tools

AMERICAN SWISS FILE & TOOL CO., 865 MT. PROSPECT AVE., NEWARK 4, N. J.

AMERICAN SWISS

SWISS-PATTERN FILES

they would almost love him and would go away, laughing.

He was one of the shining lights who ever got out from under the bushel, and, today, there are old men who praise him, for, during their younger years, he taught them much both in the trade and in decency.

Squareness and fair dealing between foreman and mechanic is a life saver for any firm.

F. H. Stebbins
Worcester, N. Y.

•

AL CERTAINLY pulled a hot chestnut out of the fire when he brought up the subject of one worker squealing on another. Of a certainty, it is the foreman's place to detect a staller in his department but unfortunately he has only one pair of eyes. Some time-killers are so adept at the science that it takes a Houdini to detect deliberate stalling.

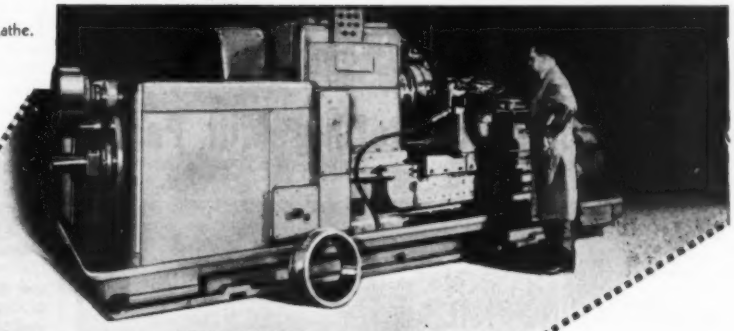
It is a funny thing, when one realizes it, but a man expends as much energy, if not more, in avoiding work as he would in doing honest labor. A professional staller is a canker sore in a well-functioning unit of production. The men, pulling together as a team, are compensated for their effort, presumably, and anyone who deliberately kills time on the job is working to the detriment of the whole group.

Although Moore has the courage to inform Al of Riley's dogging on the job it isn't appreciated because it goes against the grain somehow to know that a worker would squeal on another—even though the act is justified. Would he not be abetting the practice were he to keep quiet? What if the remainder of the crew were to resort to the same thing? Soon the power would be shut off 'cause the boss couldn't pay the bill! Al is faced with a problem of openly appreciating the information given by Moore and going to bat with Riley or he can ignore the "grapevine" and wreck the informer's loyalty to him and the rest of the men.

Which is the greater evil, that of discouraging an honest man's sense of loyalty or acting on the information to see that the wrong is rectified? The whole question resolves itself into the question of what is right. Poor Al will toss around on his pillow trying to decide.

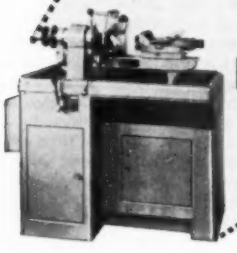
Habitual squealing is to be discouraged. Some people delight in digging things up for that purpose. I don't see where Al could do anything other than to accept the in-

Jones & Lamson 28" Fay Automatic Lathe.
SKF-equipped.



BIG

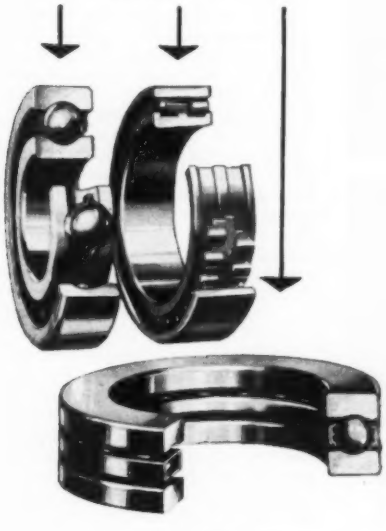
or



little

or in between—
it's SKF anti-friction bearings for modern machine tools

Wade Precision Hand Screw Machine.
SKF-equipped.



Removing 98 pounds of SAE 52100 forged steel in 8 minutes is regular performance for this Jones & Lamson lathe. This tough, exacting job is the machining of inner rings for SKF double-row spherical roller bearings—forming at 330 FPM, turning at 340 FPM. The use of SKF double-row cylindrical and thrust ball bearings gives maximum rigidity at the tool.

SKF Bearings are also standard equipment on the Wade Precision Hand Screw Machine. An SKF double-row cylindrical roller bearing at the spindle nose gives maximum spindle rigidity and accuracy. In combination with a separate SKF precision thrust bearing, deflection or yield is almost completely eliminated.

Here again is specific evidence that for any machine tool—large or small—wherever a shaft turns, there are SKF Bearings especially designed to maintain accuracy at required speeds and loads. For further information concerning SKF machine tool bearings, ask for Catalog No. 272. SKF Industries, Inc., Philadelphia 32, Pa. 6603

Machine Tool Bearings engineered by SKF

Vapor Stops Rust

for Exporter of Rolling Mill Parts

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★ PACKAGING TIME SLASHED with

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For facts that tell how *you* can ship and store metal articles or parts RUST-FREE at less cost . . . write today to:

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formation in a way that would let Moore know that he had brought up a very ticklish situation. Some men would have taken the attitude, "Ah, ta hell with it; what do I care about how much the guy stalls? If he can get away with it, that's his business." Some would not blame Riley for bending the informer's smeller if he got wind of how the boss got wise to things.

As I stated in the start of this discussion: It's a hot chestnut and the more I dwell on it the hotter the darn thing seems to get. If Riley is deliberately stalling on the job, and Al comes by the information through the efforts of another worker, the foreman must resort to some of the most tactful strategy in order to get the situation remedied without in any way involving the one who put him wise. Inasmuch as I am greatly averse to tale carriers, were I in Al's place I think I would chuckle inwardly at the chance of knowing something of what was going on behind my back. Is it possible for a man to feel warm inside at the same time evince keen disapproval! For one thing Al, now knowing that Riley was double-crossing him by laying down on the job, could be on his guard so as to get the information first hand, then he could go after the culprit and lay the law down good and proper.

For Al's interest, and to maintain his respect among the other men in the shop, I think he should have a talk with Moore and let him know that while he appreciated knowing about Riley, he didn't countenance the practice of carrying tales. He could convey the information in such fashion that Moore would understand the situation he was placed in. Once it becomes known that a foreman is a willing receiver of such information he loses the respect of his men.

Jack Everett
San Francisco

•

THE EMPLOYEE who carries tales to the boss is looking for approval. If he finds out that the boss does not like this kind of gossip he will soon mend his ways. Evasion, gossip, buck-passing and carrying tales is the quickest way to become unpopular with the boss and also the employees in general. These bad habits usually turn out to be a boomerang. The supervisor must know his men. Some foremen trust these tail-tellers the same way they would treat a baby. The employee may be on the job physically, but if he is not there men-

tally he is not producing. Fortunately most employees know the quickest way to wipe out a friendship is to sponge on it. The foreman must know the facts before he balls out any employee. The foreman usually knows what's going on and the employees are aware of the fact. To cure this fault and to put this gossiper in place tell him you know what's going on, who is producing and where an improvement is necessary. If the employee is worth saving praise some other good quality before criticism.

A. E. Salmons
Philadelphia

PERHAPS the best answer to whether Al can get out of his problem of one man squealing on another is to say that a well trained alert foreman would never have gotten into such a position. Proper handling of foremanship is like anything else—either you work at it or you answer the consequences of not knowing your job.

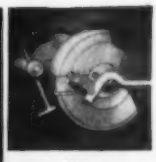
Let us not pour our criticism on the poor foreman, however, for while perhaps he deserves it, chances are he was never properly schooled in foremanship. A good chance is that he was made foreman because he knew the work and how the machines operated. Maybe he got along with his fellow workers or perhaps he was the boss's pet. How he got his job is not important. He is now a foreman and certainly needs guidance. For how is a man who has spent his time working as an employee of management going to be able to properly evaluate and handle management problems when he is selected to join the front line of management? How sad it is that industry today, as a whole, does not pay more attention to their front line defenses and less time to bragging about how well the top structure of the company operates.

Yes, Al is in a tough spot. To allow one man to tell tales on another and expect to act on those tales is like playing with TNT. You may blow yourself to bits. Why did Al know that his man was stalling? What has Al been doing sitting in his office playing the big shot? Perhaps Al doesn't really know his men. Is he sure that Moore isn't out to just make trouble? Since Al didn't know about the loafing maybe he should not be too hasty to move.

The best answer to date would be to let the entire thing drop. However, let it be a lesson to all foremen to be sure and know what your men are doing. Don't assume that because

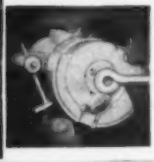
Hydraulic Eye-Bender . . .

for production shaping of small stock and forming round or oval eyes, hooks, etc.



Above
Starting bend

Below
Finished eye



- Completely new, self-contained, hydraulically operated bender
- Welded steel construction
- Hydraulic pump with direct drive, 5HP electric motor
- Footbutton control; "inching" button provided for setting dies.
- Capacity: 1" diam. stock (hot) around a 1½" mandrel
- Strokes per minute, 20

The machine described above is typical of the up-to-date, efficient machines by WILLIAMS-WHITE & CO.

Write for free information regarding this and other WILLIAMS-WHITE machines, including presses, bulldozers, punches, shears, rolls and hammers for every type of heavy production.

MAKERS OF QUALITY PRODUCTION TOOLS FOR NEARLY 100 YEARS

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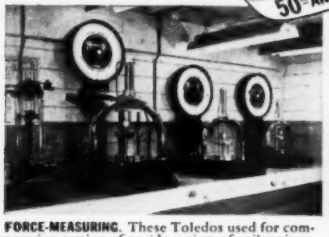
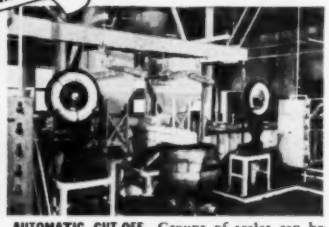
PRINTWEIGH SCALES stop errors... print big figures — accurate weights—with split-second speed.



FORCE-MEASURING. These Toledos used for compression testing of a wide variety of coil springs.



AUTOMATIC CUT-OFF. Groups of scales can be electrically interlocked for completely automatic batch control.

After you've fought the battle of high costs, "criticals" and shortages to obtain materials—don't waste them through careless handling! Tighten your control at every step! See that you have up-to-date scales—and enough scales—throughout your materials handling operations. See if you could use Printweigh to stop losses through human errors. Whatever your problems in weighing, checking, testing, counting, batching or force-measuring . . . there's a modern Toledo to do a better job. Send for latest weight control bulletin 2020X. Toledo Scale Company, Toledo 1, Ohio.

PRINTED WEIGHTS!

Toledo Printweigh Scales provide printed weight records . . . assure you that the accurate indication of the Toledo dial will reach your accounting records without chance of human error.

TOLEDO

HEADQUARTERS FOR SCALES

production reports show high figures that all is well. Make sure for yourself. Get out around the plant and see with your own eyes. Set up, if necessary, production checks on individuals if you think they are stalling. Don't in any case act on someone else's opinion, unless you are convinced you are right. Have a mind of your own but don't be too stubborn to admit you are wrong when conditions point that fact out.

A word to the higher supervision level: Don't just think this happens only to foremen. Look over your own actions and be careful how you handle such problems. They have far-reaching effects many times. You can help yourself and also your foremen if you take time to discuss problems of this and similar nature. Don't call it training, but rather set it up as a discussion group. Make it work both ways. Management today needs to establish a lot of discussion groups to iron out problems that constantly appear. It will help labor relations, and will increase productivity of the plant in general. We must start now before it is too late. Our free enterprise system is in grave danger. Management holds the key to this problem. Discussion of problems, techniques and operating principles with the workers and employees can effectively slow down our decline and can in time reverse the trend.

Charles D. Townsend
West Hartford, Conn.

•

HEAD BEATS HANDS

WHEN WE search the dictionary we come up with these definitions for lazy: (1) Not desirous of doing any —work; (2) Slothful; (3) Indolent. Now it seems that none of these quite fit Bill Laziazell unless we can insert "unnecessary" in the blank in the first definition. When we do this we have a definition that fits a lot of his forebears going back a lot of years. It was one of them that fashioned the first yoke for the necks of the first oxen, and it was not long ago that one put an engine in the wagon and cars behind it to produce the first railroad train.

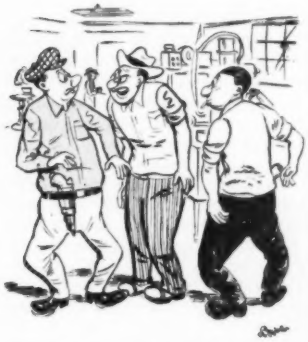
You see it is no wonder that Bill found an easier way to do more and better work with less expenditure of energy than Butters had been doing but, and it is a big but, who gets the credit for the improvement—Madison who was wise enough to see through Bill's shell of reticence or Bill who came up with the real knowhow for the improvement? There is no possible doubt that Madison is a wise owl who recognizes

ability when he sees it and that there are too few of his kind in our shops and offices.

If there were enough Madisons around to find them you would discover a much greater abundance of these Bill Laziazells than is now apparent with the over-abundance of men like Ed who merely demand servile obedience from those whose energies they are directing. There is no place in Ed's thinking for other than "yes men." Men like him, in places of authority, hang out big signs reading "No Ingenious Help Wanted" at the doors to their departments. They are neither looking nor willing to give credit for the accomplishments of those who cannot pass their restrictive tests for usefulness. We do have them and in super abundance and can only hope that they will gradually disappear from the American scene before they destroy it by their reactionary thinking.

It is one of the secrets of the universe as to the number of Bill Laziazells who have drifted through life because they never came under the influence of a Madison who could raise them above the erroneous appraisal of the Eds and Als. A few of them turn out to be Edisons who were not discouraged by being thrown off the train of life because of their experiments but too many of them do not have quite enough intestinal fortitude to overcome their obstacles by themselves. They need a Madison to lend a hand over the hard places. Otherwise they merely drift through life without an anchor to keep them off the rock of dereliction or they develop that opposite charge of anti-social thinking which we call bolshevism.

So I inject into your question these two additional phases: How can we properly reward Bill Laziazell for his



"I wish you guys would quit seeing so many western movies!"

ALIKE AS—

"Peas in a Pod"

● STANLEY Tools, famous for quality the world over, are marked cleanly, accurately and permanently with Parker steel stamps. Each marking die and stamp embodies the same degree of accuracy and perfection as the tools themselves. The dependable STANLEY name is permanently indented into each tool as a lifetime mark of a better product. Parker steel stamps individually, or by the hundreds, perfect in every detail, mark famous names on famous products everywhere.

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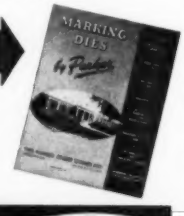
Precision marking dies — steel type and type holders — numbering heads — hand and press marking dies — roll marking dies — mechanical engraving — hobs — embossing and coining dies. Now or for future reference, be sure to have the Parker Blue Book in your file.



THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
by Parker
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

contribution to the common good and how can we develop more Madisons with the insight to find the Bills and gain for society the benefit of their peculiar abilities rather than letting them deteriorate into menaces to the common good? Keep the Rip Winkles and Joe Dunderheads on the payroll if you must in order to get that bit of extra work out of them that cannot be had when they are on the public relief rolls, but by all means learn to have and use the insight demonstrated by Madison when he gave Bill a helping hand.

Arthur B. Clay
North Canton, Ohio

NEW BOOKS

WAGE POLICY AND PROBLEMS IN A PREPAREDNESS ECONOMY — *Personnel Series No. 136. Published by American Management Association, 330 W. 42nd St., New York 18, N. Y. 35 pages. Price $1.25.*

Five papers presented at the Fall Personnel Conference of the American Management Association are reprinted in this pamphlet. Included are: The Thinking Behind the 1950 General Motors Agreement; Impact of Mobilization on Company Wage and Salary Structures; Collective Bargaining in a Transition Economy —A Trade Unionist's View; Economic Issues in Labor Management Relations; and Trends in the Wage and Salary Picture.

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ANALYTICAL AND APPLIED MECHANICS, THIRD EDITION. *By Guy Rogers Clements and Levi Thomas Wilson, Department of Mathematics, United States Naval Academy. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York, N.Y. 458 pages. Price $5.50.*

This is a standard text at college level on the subjects of vectors, multiple forces, center of gravity, mechanical motions, impulses, dynamics, and stresses and strains. The third edition covers the motion of mass systems and mechanical vibrations more thoroughly and statistics more briefly than former editions. There are more than 1000 problems (with answers), located at the ends of sections within chapters, and simple, easily understood illustrations cover many of the points in the text.

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To help you get the maximum benefit from the STANORUSTs, Standard Oil has a corps of lubricating specialists located throughout the Midwest. One of these men is near your plant. You can get his services quickly and easily. His wide experience and special training in rust prevention will help you make real savings. Why not arrange today for his visit by calling the nearest Standard Oil (Indiana) office?

8 grades of STANORUST

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is a fingerprint remover. It can be used to eliminate the cause of fingerprint corrosion and to deposit a protective film in one simple dipping operation.

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has a Stoddard-solvent base which evaporates to leave a thin film for temporary rust prevention.

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provides economical protection under average indoor conditions. It can be applied cold.

STANORUST No. 95
is designed for protection of parts in moderately severe indoor storage. It also can be applied cold.

STANORUST S-1
is a semi-fluid product, designed to give protection over a longer period than the No. 95 grade. It is suitable for outdoor service, if parts are under cover.

STANORUST 1-XC
is a non-fluid product which is recommended for protection of parts under severe outdoor conditions. It has been thinned with a volatile solvent and can be applied cold with a swab or brush.

STANORUST 3-X
is a soft, grease-like product and offers protection against severe indoor storage and moderately severe outdoor conditions.

STANORUST 6-X
is a heavy, petrolatum-type product that protects against the most severe outdoor exposure. It meets a government specification which includes a requirement that it protect against corrosion for a period of not less than 10 years without renewal.

For maximum protection against rust . . .

● STANORUST Rust Preventives offer maximum protection against rust because they contain a moisture-displacement additive which makes them far superior to straight mineral oils or to petrolatums frequently used for rust prevention.

The STANORUSTs have been thoroughly tested and proved effective on a wide variety of rust prevention jobs, ranging from elimination of fingerprint corrosion to protection of equipment under severe outdoor storage conditions.

The complete STANORUST line is briefly described at the right. The booklet offered will bring you complete details. You can secure a copy by calling the local Standard Oil (Indiana) office or by writing 910 South Michigan Avenue, Chicago 80, Illinois.

STANORUST
REG. U. S. PAT. OFF.
RUST PREVENTIVES

SEND FOR THIS BOOKLET

STANDARD OIL COMPANY (INDIANA)

STANDARD

NOW more important than ever to you

You are, or may soon be, shifting your production setup to meet the country's rearmament needs. New machines, new operations, and faster production schedules will demand some revision of your lubrication practices. That's why Standard's Service-Supply organization is now more important than ever to you.

Standard has a service-supply warehouse within a short truck-hauling distance from your plant.

If you are a Standard Oil customer this warehouse will stock every lubricant used in your plant. Deliveries can be made in a few hours if necessary.

In addition, this service-supply center is headquarters for a Standard Oil lubrication specialist who is assigned to your plant. He is close at hand to give you help when you need it. He has plenty of practical experience. He has been specially trained for his job in a Standard Oil Lubrication Engineering School. He is backed by Standard Oil's extensive research and technical facilities.

To arrange for his visit, phone your nearby Standard Oil Service-Supply center or write to: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (INDIANA)

WANTED *Most* FOR VERSATILITY

V & O
LONG SLIDE *Precision* POWER PRESSES

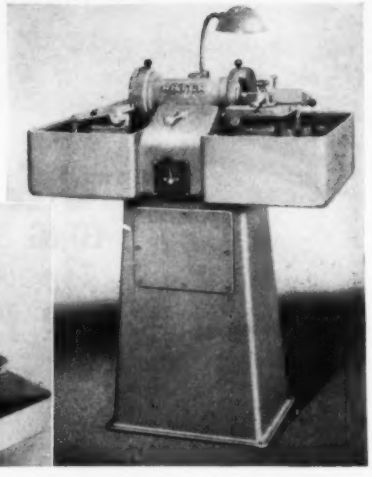
Many press men, aware of the production advantages and economies afforded by V & O Long Slide *Precision* Power Presses in the blanking . . . drawing . . . forming . . . and perforating of all types of regular parts, also make full use of this highly versatile power press in the high-accuracy production of an infinite variety of irregular-shaped pieces.

The reason is: V & O power presses have *all* the advanced engineering features — *including the exclusive V & O long slide for accurate guiding* — that add-up to provide the advantages of higher accuracy . . . faster production . . . longer die life . . . and lower costs. Ask your V & O sales engineer to give you further details relative to your specific press work requirements.

Available in sizes from 3 to 105-ton capacity

THE V&O PRESS COMPANY
DIVISION OF HARTFORD-EMPIRE COMPANY
Builders of Precision
POWER PRESSES and FEEDS
Since 1889 **HUDSON, N.Y.**

ARTER
IMPERIA Carbide Tool GRINDER
Model 200



Off-hand grinding of tools is seldom a satisfactory operation. Hands are unsteady, tool shanks can be rough or not flat, work tables may not be smooth. The result—poor tool grinding, shorter life between grinds, possible damage to expensive diamond wheels.

ARTER IMPERIA CARBIDE TOOL GRINDER work tables are **movable.** Tables are held on two pivot-edged side plates by vertical tension springs, forming a flexing mounting. Very light hand pressure moves table and tool forward and back across the face of the diamond wheel. In-feed is made by a knurled knob bearing a graduated disc. The work tables can be tilted to the required degree of angularity. Two protractor type graduated tool holders are standard equipment. When grinding chip breakers the wheelhead also can be moved up and down, a compression spring giving smooth easy action. This compact double-table machine can be set up for roughing and finishing tools, finishing and polishing, or finishing and grinding chip breakers.

ARTER GRINDING MACHINE CO.
WORCESTER 5, MASS. • U. S. A.

From the *American Machinist* Library of *Tips for Top Shop Men*

BE sure you are modernizing a *job*, not just a machine. A new piece of equipment never gets a fair chance if units ahead and after it are still ancient klonkers and if feeding and workhandling devices are inadequate.

IF your plant is still departmentalized, study the advantages of straight-line rearrangement. Handling is usually too expensive nowadays to justify the luxury of having each type of machine tool segregated. The same goes for heat treating, cleaning and assembly.

3 Ways to Shrink your biggest production expense

1. ***Be sure to visit the Materials Handling Show in Chicago,*** April 30 - May 4. (Conservative estimates indicate materials handling often represents one-third of metalworking production costs, and you'll find many machines on display that can shrink these costs for you.)

2. ***Visit the American Machinist staff in Booth 448.*** (We'll have copies of our "Show-in-Print" Special Report on hand. You will find it a big help in making sure you budget your show time efficiently. Our staff will also welcome a chance to discuss materials handling problems and opportunities with you.)

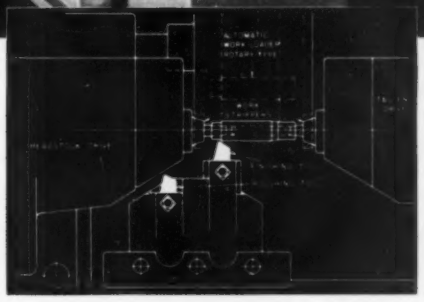
3. ***Get the best and latest materials handling ideas regularly in American Machinist.*** (Metalworking men have long found *American Machinist* a far-sighted, alert guide to the best in modern materials handling equipment and techniques.)

American Machinist

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

HOPPER-LOADED *Lo-swing* IMP LATHE SPEEDS AUTOMATIC PRODUCTION OF VALVE GUIDES



Problem: To automatically load, rough and finish turn and automatically eject valve guides on a high production basis.

Solution: The Lo-swing IMP Automatic Lathe selected for this job was equipped with a Rotary Type Loader and a newly designed Hopper (capacity 200 pieces) which assure a constant flow of Valve Guides through the machine on a completely automatic cycle. This lathe is also equipped with revolving head and tailstock spindles driven from a splined jackshaft. The advantage of the double-end drive is twofold. Since the piece is driven from both ends, much coarser carriage feeds are possible, thereby considerably increasing production. Also, the double-end drive assures synchronization of the speed of both spindles and eliminates slippage wear on the centers.

Valve Guides, which have been previously bored to size, are placed in the hopper and fed by gravity into openings in the Rotary Loader. A mechanically operated agitator prevents the parts from jamming as these approach the lead-in chute. The Rotary Loader indexes the pieces to the proper position, where they are automatically picked up by the continuously revolving centers of both heads.

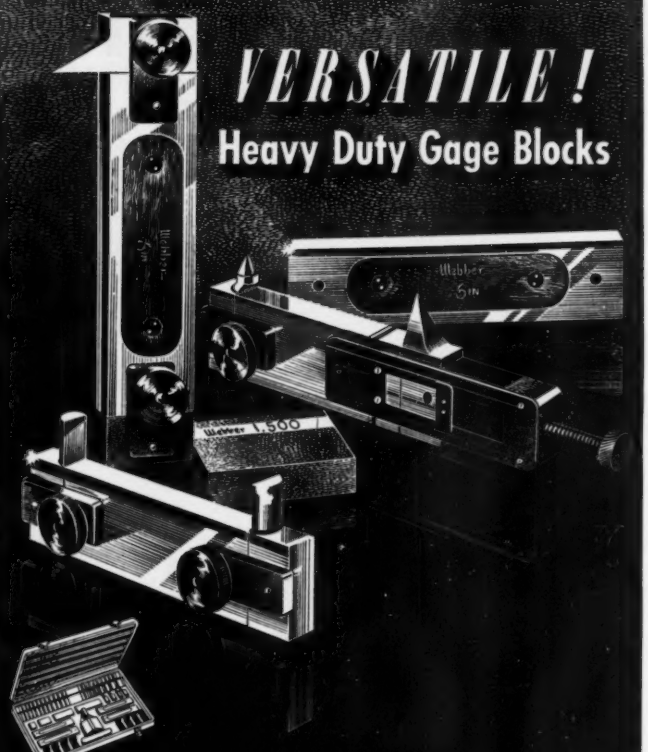
The O. D. is rough and finish turned in the same operation with two separate carbide tools, each having its individual rate of feed. The finish turning tool begins cutting after the roughing tool has been relieved from the work, thereby assuring close concentricity between bore and finished diameter. The Rotary Type Loader assures complete control over the fast revolving pieces, eliminating danger to personnel and damage to the pieces which are completely stationary by the time they reach the discharge chute.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

VERSATILE!

Heavy Duty Gage Blocks



H. D. BLOCKS and FIXTURES

STANDARD STEEL BLOCKS

CARBLOX CARBIDE

ANGLE BLOCKS

- Assembled in a few seconds
- Extra large gaging surface
- Sturdy, rigid build-ups
- Low in cost

Details on request

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GAGE COMPANY
12901 TRISKETT ROAD
CLEVELAND 11, OHIO

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

built for LONGER USE

Reduce costly delays and bottleneck breakdowns, eliminate need for a large supply of replacement parts. Equip your plant with Coffing Quik-Lift electric hoists. They're built to *stay on the job* — to give you continuous operation in the toughest day-after-day work.

backed by BETTER SERVICE

Prompt, efficient Coffing service, with immediate shipment of parts further protects you against costly down time.

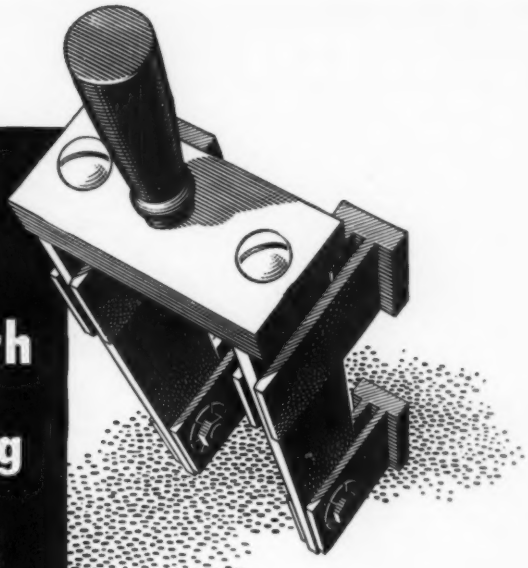
Put one or two Quik-Lifts on the job. Prove to yourself that for extra endurance backed by efficient service there is a difference in electric hoists.

COFFING Quik-Lift ELECTRIC HOISTS

Write
COFFING HOIST COMPANY
Danville, ILL.
for Bulletin
AM3E

Hoist-Jacks • Safety-Pull Ratchet Lever Hoists • Mighty-Midget Pullers • Spur-Geared Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys.

They Save $358.54 a Month by not Pulling this Switch



Every day the machinery in a Clinton, Mass. plant* had to be stopped for a half hour while those machines were lubricated. Every stop meant lost production time plus a $14 expenditure for lubrication.

The Clinton people called in an Alemite Lubrication Engineer. They wanted to know if they could eliminate the costly interruption in production time. They felt that lubrication was costing them too much.

The Alemite Lubrication Engineer studied their problem and recommended a system that automatically lubricates the machinery without any shut-down. What's more, lubrication cost was cut from $14 a day to only 21c a day. That saving alone paid for the entire investment in just 43 days.

Call Your Alemite Lubrication Engineer

No matter what size or type of plant you operate, Alemite can show you dozens of ways to save through the more efficient handling of petroleum products. Call your local Alemite Industrial Distributor now or send for the free booklet "11 Ways to Cut Production Costs." Simply attach the coupon below to your letterhead. Dept. D-31, 1850 Diversey Parkway, Chicago 14, Ill.

*Name on request.

ALEMITE

MEANS EVERYTHING FOR LUBRICATION

1. Methods 2. Lubricants 3. Equipment

Another Product of Stewart-Warner

Alemite Cuts Costs 3 Ways

1. In transferring lubricants... cuts man hours 63⅓ for every 100 pounds transferred. No mess, no contamination.

2. In loading grease guns... saves 3⅓ man hours for every 100 pounds of lubricant loaded into hand guns.

3. In applying lubricants... saves up to 23.9 man hours for every 100 pounds of lubricant applied to bearings.

FREE! Valuable booklet—
"11 Ways to Cut Production Cost"
(Simply attach to your letterhead)
ALEMITE, Dept. D-31
1850 Diversey Parkway, Chicago 14, Ill.

We'll include facts on the new Alemite Oil-Mist System, too—(OIL-MIST atomizes oil into mist, circulates it to bearings under pressure. Increases life of bearings as much as 17½ times).

Name .....

Company .....

City ..... State .....

1919 **CURTIS** 1951

Exclusively a manufacturer of

UNIVERSAL JOINTS

- **Ball type for light duty applications**
- **Standard—for heavy duty and**
- **Lo-Friction for special duty work**
- **14 sizes in stock at all times and ready for sample or volume shipments. Stock sizes ⅜" thru 4" O.D.**

Write us for information on other than stock sizes up to 6" O.D. and for other than ordinary applications and requirements. As exclusive manufacturer of Universal Joints, we specialize in design collaboration. We invite your inquiry — in detail.

For over a quarter of a century Curtis has pioneered in the manufacture of Universal Joints. Famous patented Curtis "firsts" include the first ball oiler, internal lubrication grooves, the "tell-tale" lock ring and the lo-friction center block.

Curtis Universal Joints are of top quality. They have to be — consistently so — for Curtis manufactures nothing else. The fact of the matter is Curtis Standards of Quality were adopted for the Class One Specifications of the Army Air Force in 1941.

FOR A QUARTER OF A CENTURY

CURTIS UNIVERSAL JOINT CO., INC.

6 BIRNIE AVENUE, SPRINGFIELD 7, MASSACHUSETTS

Free engineering data sheets and price list upon request.

If you're going to the Materials Handling Show...

(Chicago, April 30-May 4)

Make Booth 448 Your First Stop

You'll find the ***American Machinist*** staff on hand . . . there will be a copy of our "Show-in-Print" Special Report waiting for you, including lots of helpful facts on what to see and where to go . . . and our staff members will welcome a chance to be helpful to you in any way they can.

Remember, too, that ***whenever*** you want the latest facts on how modern materials handling can boost production and cut costs in your plant . . . the best place to find these facts is in

American Machinist

From the *American Machinist* Library of *Tips for Top Shop Men*

EVERY time you try something new, somebody will call it "a dangerous precedent." Remember that everything new is either wrong or a dangerous precedent to the timid. If you let such reasoning sway you, you'll never do anything new. Only ideas that aren't "dangerous precedents" are the duds.

IF you're planning to introduce a labor-saving method that will displace men, and you know there'll be a kickback, get it set to go anyway. Then wait for "evaporation" — normal quits and dismissals — to cut your working force to the newer, lower, level. There'll be no trouble—if your men trust you and the company.

RODGERS HYDRAULIC INCORPORATED

ST. LOUIS PARK, MINNEAPOLIS 16, MINNESOTA

January 2, 1951

Carlton Machine Tool Co.,
Cincinnati, Ohio.

Att: Mr. Kenneth L. Volz

Dear Sir:

I am taking this opportunity to mail you this photograph of our new six foot, nineteen inch column Carlton which we installed September 1950.

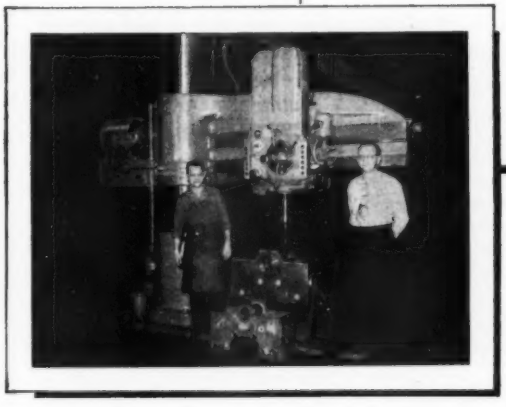
We are designers and builders of all types of Hydraulic equipment. In the past we experienced a great deal of difficulty in building our pumps and heavy equipment not only because of accuracy but also the cost.

Please note the casting in the enclosed photograph. It formerly required approximately eight to nine hours to machine one. I requested a survey on this job. Last January 1950 your Mr. Jim Carlton advised us that this job could be done complete in a radial using a revolving fixture. We are very happy to report that we are now making five complete castings in eight hours and doing a far better job. We believe there is no finer radial built.

I wish to thank you and your company for your advice and wonderful cooperation.

Very truly yours,

Vernon C. Levine,
Plant Supt.

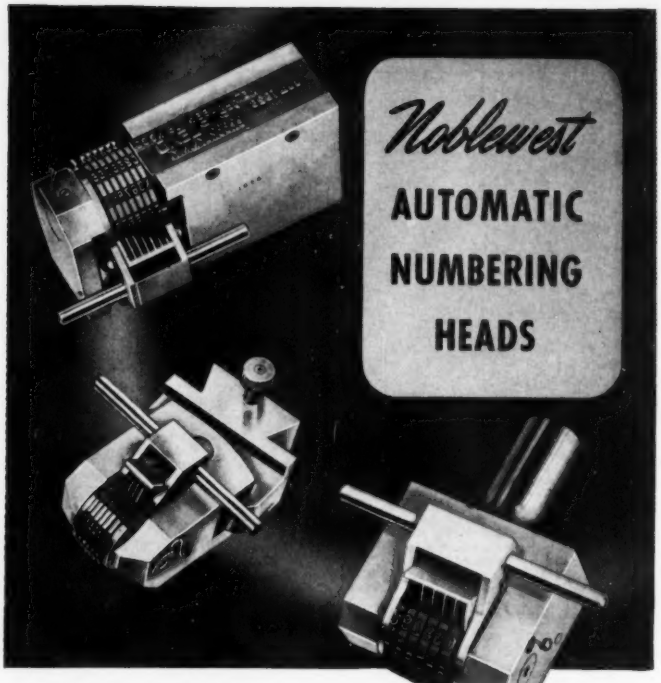


This unsolicited letter from a valued customer tells simply and effectively why Carlton is your best buy in radial drills. Let us know your requirements . . . we'll see that you receive complete information promptly.

Carlton

THE CARLTON MACHINE TOOL CO.

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO



for permanent serial numbering

Noblewest automatic numbering heads are a product of long experience. They are well-known for their dependability and long life wherever *permanent* serial numbering is required on steel and other metals, wood, fibre, hard rubber and plastics. Numbers are automatically advanced. Can be used in either marking presses or roll-marking machines. Applications include numbering on nameplates, machines and component parts. Noblewest numbering heads also furnish a direct reading at all times of the *exact* number of pieces marked—a valuable aid to production control.

STANDARD MODEL (at bottom of illustration) for serial numbering. Can be furnished in any size of numbers and with special characters as needed.

SPECIAL MODELS can be made in combination with dies (top of illustration) and to any other requirements including embossing and debossing heads. For prices write Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Connecticut.

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

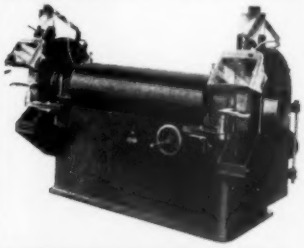
Always

The RIGHT Speed for the Job!

BRADFORD

Infinitely Variable Speed

SNAGGING GRINDERS



SAVE ON GRINDING WHEEL WEAR

by use of constant maintained surface speed control. Save labor—no belts to move, no gears to change. Speed is adjustable while grinder is running. Maintained speed automatically adjusted to wheel wear. Designed to give 9500 SFPM for Hi-Speed Wheels or 5500 SFPM for Vitrified Wheels. Four models for wheel sizes 20" to 30" diam. by 2" to 4" face—7½ to 30 HP.

Savings in grinding wheel costs will pay for a Bradford in a short time. You'll get better quality work and higher production.

BRADFORD

Infinitely Variable Speed

BUFFER AND POLISHER

VARIABLE Speed Control Drive permits selection of any speed in infinite steps from 1500 RPM to 3000 RPM. Speeds may be changed instantly while buffer is running; to change from job to job; to maintain correct surface speed for material being polished or buffed; for size of wheel being used. Two Models: Single Motor, Double Spindle; or Double Motor, Two Independent Spindles. 5 and 7½ HP.

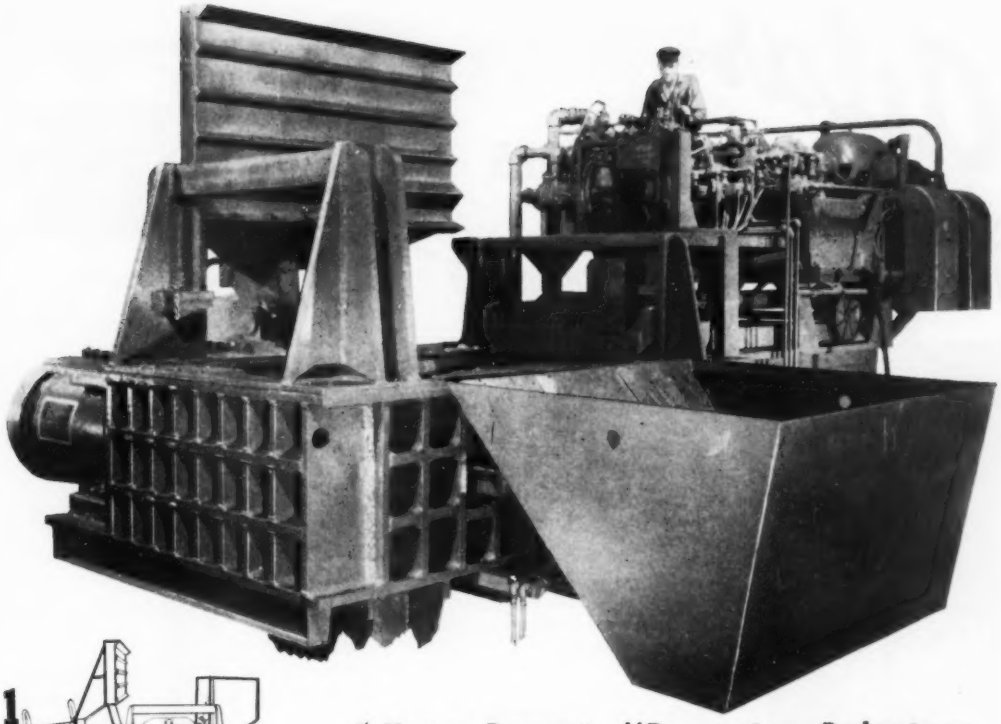
You'll get more and better production plus savings in wheel costs and labor with Bradford Infinitely Variable Speed Snagging Grinders and Buffers. *Complete details and specifications sent on request.*

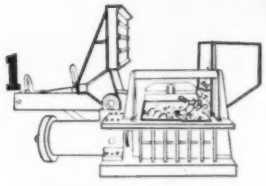
THE BRADFORD MACHINE TOOL CO.

664 Evans Street, Cincinnati, O.

PORTABLE ELECTRIC DRILLS, SAWS, SANDERS, BENCH AND PEDESTAL GRINDERS, BUFFERS, POLISHERS

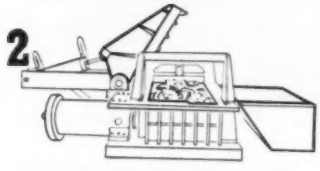
Precision since 1840





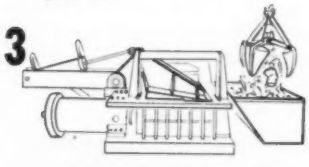
1

Skip-Pan Loader dumps scrap metal into charging box. Auxiliary Compression Door is in "up" position ready for immediate action once operator touches hydraulic controls.



2

Skip-Pan returns to loading position as Auxiliary Compression Door begins its "one stroke" compressing operation.



3

Door compresses scrap, permitting charging box door to be closed without further arranging. During baling cycle Skip-Pan is reloaded and charge dumped into box as soon as bale is ejected.

★ Users Report—"Dempster-Balesters Turn Out 25% Greater Tonnage With Auxiliary Compression Door" . . .

The high-speed Model "600" Dempster-Balester, shown above, produces bales at the rate of 6 to 7½ tons per hour. With Auxiliary Compression Door, which users report increases the 6 to 7½ ton rate by a conservative 25%, this Dempster-Balester is making scrap metal baling more profitable than ever before! With its simple construction and two ram design, this big capacity press is easy to install . . . economical to operate. The hydraulically operated Auxiliary Compression Door compresses heaped scrap into the charging box with a 45-ton force. The hydraulically actuated Skip-Pan Loader, another cost-cutter, is standard equipment on all models. This invaluable feature permits preparation of a new full charge while press is baling. Illustrated at left, is the 1-2-3 production punch of a Dempster-Balester with Auxiliary Compression Door and Skip-Pan Loader. Write today for completely illustrated folders on the Dempster-Balesters, Models "600," "275," and "128." All are products of Dempster Brothers, Inc.

THE "275"

The Dempster-Balester Model "275" turns out scrap metal bales at the rate of 3½ to 4 tons per hour, plus a normal 25% increase with Auxiliary Compression Door. It produces high density bales weighing between 300 and 400 pounds.

DEMPSTER BALESTER

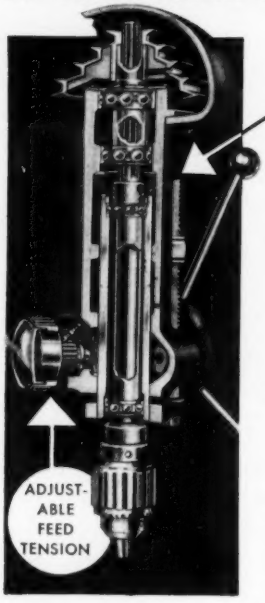
TRADE MARK REG.

DEMPSTER BROTHERS

431 Dempster Bldg., Knoxville 17, Tennessee

Atlas DRILL PRESSES

Set NEW Quality Standards In Construction and Performance!



More, good new features are included in Atlas drill presses than any other comparable size drills on the market.

Long accuracy life is assured by the exclusive Atlas "floating drive" with six-splined spindle and steel drive sleeve that floats on *two* ball bearings. *Two more* ball bearings — widely spaced — float spindle free from quill.

Other accuracy and service features include extra-heavy construction of head, table, column, and base—exclusive quill-stop bumper—coordinate locks for head, table, *and spindle*—widely spaced column bearing surfaces in head.

And such features as the exclusive vernier-type depth stop, adjustable feed tension, three spoke feed wheel, and built-in switch make operating easy.

WIDEST COLUMN BEARING — GREATER RIGIDITY
DEPTH CONTROL STOP DIRECT READING, VERNIER ADJUSTMENT
10" x 10" PRECISION GROUND TABLE TILTS ANY ANGLE LEFT OR RIGHT — LOCKS SECURELY.
2¾" GROUND STEEL COLUMN

NOW 50 Atlas DRILL PRESSES

to Meet Industrial, Commercial, Tool Room, and Maintenance Needs

By every standard—construction, performance, cost—today's Atlas is the greatest drill press value. Its unusual strength and ruggedness mean extra years of accurate, trouble-free service. Its unique precision features assure smooth running and dependability on close tolerance work. It will stand up on 24-hour production schedules, or serve you well in the tool room. See your Atlas dealer for current prices and deliveries.

ATLAS PRESS CO., 304 N. Pitcher St., Kalamazoo, Mich.

Please send Drill Press catalog and literature about all Atlas metalworking tools.

Name_____

Address_____

City, State_____

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DEPENDABLE QUALITY TOOLS

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There is no charge to qualified users.

Yours for the Asking!

New catalog tells how to adapt your milling machines for power circular milling, indexing, or an almost unlimited range of special work requiring an automatic revolving fixture.

No setup time! Plug into nearest electric outlet.

42" Heavy Duty model. Table diameter can be increased to 72" with subplates. Infinitely variable feed. Automatic positioning

20" model. 18 quick feed changes 1½" to 54", or 3" to 108".

Mail Coupon NOW!

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Send catalog on Knight Rotary Tables.

Name .....

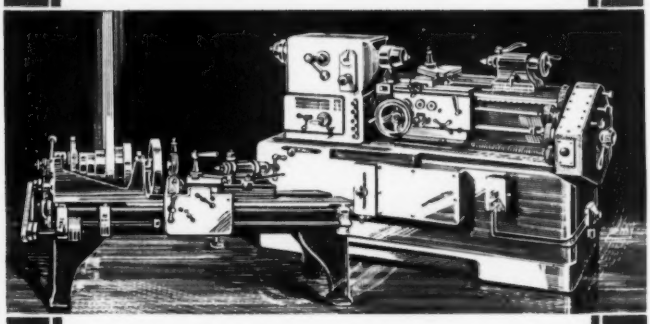
Title .....

From the *American Machinist* Library of *Tips for Top Shop Men*

THE really competent man multiplies his effectiveness by every man he influences. One man, no matter how able, is still one man, but one man believed in by enough others is unbeatable.

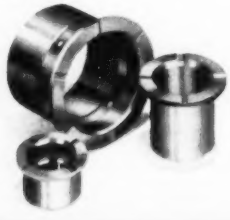
BE sure your machine tools don't spend most of their "working" day as layout tables. A machine tool earns its keep only when it is cutting metal. Jobs can be set up on a surface plate or bench by someone else —frequently someone better at setup than the machine operator.

JOHNSON BEARINGS
1901-1951



Getting Today's Higher Speeds Required Progress in Sleeve Bearings

The advanced engineering of modern machine tools was made possible by the improvement of materials and production methods for the many component parts. Johnson Sleeve Bearings are examples of this fifty years of progress . . . new bearing styles, improved design, refined alloys, new materials, and greater precision. Most of the Johnson Bearings of today show only superficial resemblance to the bronze castings and heavily babbitted bearings of fifty years ago. The wide experience and "know-how", accumulated over the years by working with manufacturers in all fields, probably can be helpful to you. Johnson engineers will gladly study your requirements and make recommendations on the types and designs of bearings needed. Write, wire or phone for an appointment.



SLEEVE BEARING HEADQUARTERS Since 1901

Johnson Bronze

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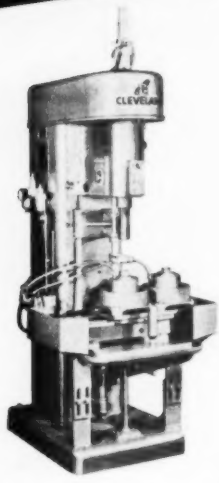
Cut Tapping Costs with
CLEVELAND TAPPERS



This Cleveland Tapping Machine is set up on a munitions job, tapping a 1 15/32", 16-pitch Buttress thread in SAE 4340 steel tubing hardened to 35 to 37 Rockwell.

On Tapping, Threading, Drilling, Spotfacing, Reaming, and Chamfering operations, the chances are that CLEVELAND engineers can save you money and valuable working time by designing a CLEVELAND Tapping Machine which will not only combine several operations but also tap groups of holes at one stroke of the machine. *Check with CLEVELAND first.*

Only CLEVELAND offers you all these features.

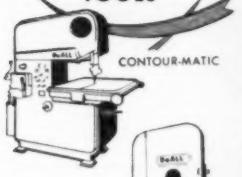
- *Precision hardened and ground lead screw.*
- *Fully automatic or manual control.*
- *Precision depth control for blind hole tapping.*
- *Heat treated alloy steel spindles for maximum strength.*
- *Easily changed spindle speeds.*
- *Exclusive super sensitive clutch reduces breakage and increases tap life.*
- *Positive coolant and lubricant supply under constant control of operator.*
- *Rigidly constructed to give years of service.*
- *Maximum safety for operator and machine.*

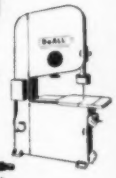
If you would like recommendations on a machine, submit prints, specifications, and sample parts. Write for your copy of the CLEVELAND Production Tapping Guide No. AM-1.

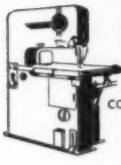
THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO

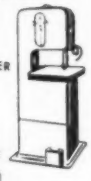
DoALL

INDUSTRY'S NEW SET OF TOOLS


CONTOUR-MATIC


ZEPHYR

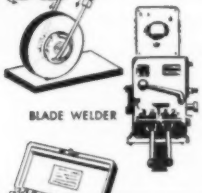

CONTOUR


BAND FILER

TOOLROOM GRINDER

CRUSH GRINDER

"COOL GRINDING" ATTACHMENT

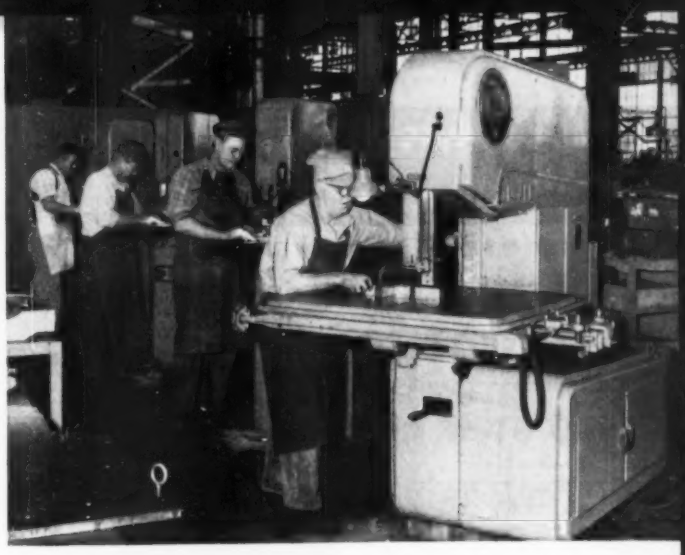

BLADE WELDER

GAGE BLOCKS

GAGE ACCESSORIES

VARIABLE SPEED DRIVES

SAW BANDS



- Steel
- Copper
- Aluminum
- Forgings
- Dies
- Plywood
- Plastics
- Laminates
- Wood
- Stainless Steel
- Alloys
- Heat-Treated Steel
- Castings
- Fiberboard
- Rubber
- Cloth
- Books
- Paper
- Glass
- China
- Ceramics
- Asbestos
- Duralumin
- Magnesium
- Tungsten
- Brass
- Lead
- Granite
- Leather
- Cork
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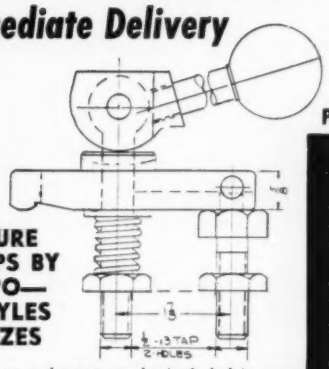
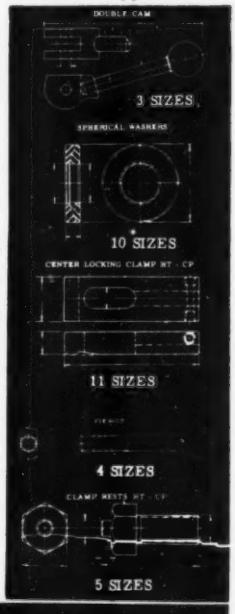


WESPO TYPE NO. 2, CLAMP ASSEMBLY

Below shows Parts of Type No. 2



FIXTURE CLAMPS BY WESPO— 13 STYLES 94 SIZES

Wespo Clamps and parts can be included in your fixture layouts. They are precision made of heat treated alloy steel, cadmium plated. Clamp Assemblies are made in 12 types—94 sizes.

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350 FIXTURE PARTS WRITE FOR CATALOG

From the *American Machinist* Library of *Tips for Top Shop Men*

THERE'S one flaw in the old saying about the better mousetrap. Somebody else must find out it has been made, or the world will never know. Remember that about plans and policies too: if you want them known, tell somebody; if not, don't even tell your wife.

COLOR and language are not the only criteria of a man's ability. Some refugees are skilled mechanics, for example, and hate the same things Americans hate. Somebody in World War II said the way to tell a man's potential is to look for a light in his eyes. Dull eyes usually go with dull wit or dulled ambition.

SMALL PLANT MANAGEMENT

1. Tells how to organize, operate, and supervise the small plant to secure a maximum of production at a minimum cost per unit. Includes considerations in financial planning, laws to be considered in production, sales tools and their use, building employee morale, controlling manufacturing expenses, etc., etc. **Edward H. Hempel, Editor, Chairman, Small Plant Committee, American Society of Mechanical Engineers. 499 pages, 45 illus., $6.00**

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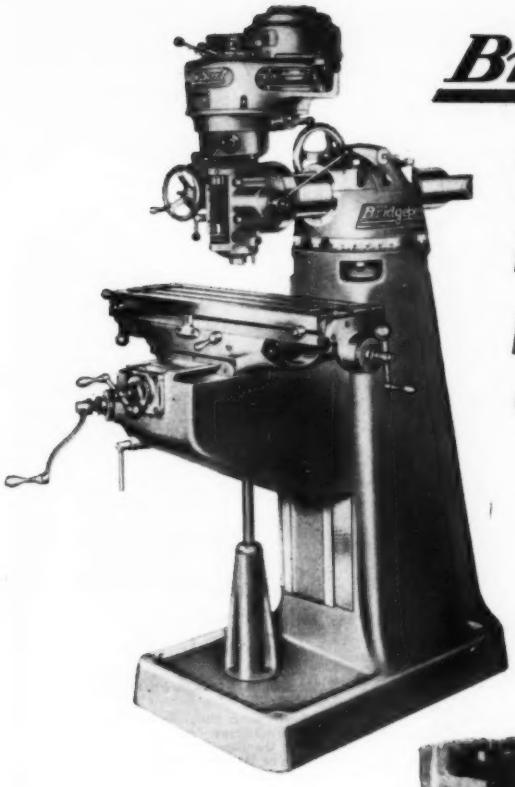
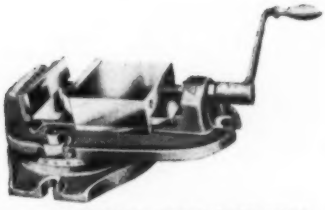
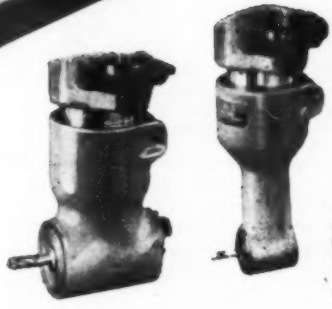
TURRET MILLING MACHINES ... *now perform more operations on heavier work*





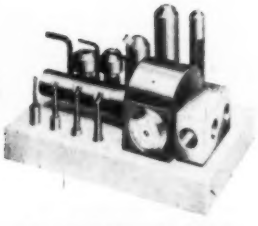
MILLING MACHINE VISE

Streamlined for greater attractiveness, this improved vise provides greater gripping power, a large diameter screw assuring rigid holding. A coolant trough adds to the utility of this vise. Made in 5"x3½" and 6"x5" jaw openings.



RIGHT ANGLE ATTACHMENTS

(Above) Heavy duty attachment which is made in two sizes. It is applicable to both the Master and the 1 HP Bridgeport heads. (Below) Light duty type, designed for milling and drilling narrow, deep molds and cavities.



No. 2 BORING HEAD

This attachment provides the means of boring holes up to 6" diameter. It is applicable to the Bridgeport 1 HP Milling, Drilling and Boring Attachment

With the advent of the 1 HP head, the capacity of the "Bridgeport" has been greatly increased. And with the addition of the attachments for this head, a much wider variety of work can be handled. Thus all the advantages of speed, convenience and accuracy which have won universal acceptance for "Bridgeports" in tool rooms, die shops and on production lines everywhere, are made available for the handling of heavier, more difficult work.

The use of these attachments on "Bridgeports" already in service will greatly extend the versatility of these machines and add many more hours of productive work. *Ask for further deatils.*

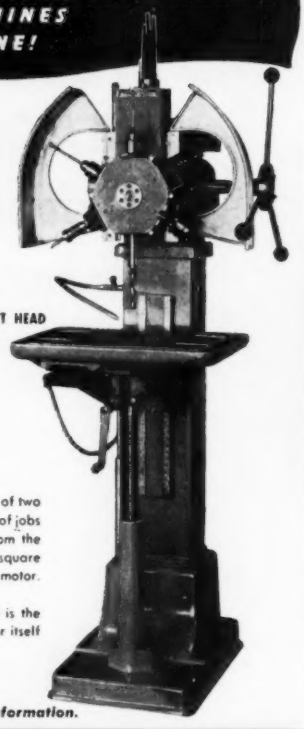
Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

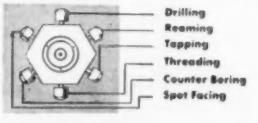
THE *Burgmaster* SIX SPINDLE TURRET TYPE AUTOMATIC INDEXING DRILLING and TAPPING MACHINE

GIVES YOU 6 MACHINES IN ONE!



Burgmaster A Universal Type Production Machine, features .....

* 8" STROKE
* PRE-SELECTIVE SPINDLE SPEEDS (choice of 6 per set up)
* INDIVIDUAL PRECISION DEPTH STOPS
* 110 VOLT CONTROLS
* 2-SPEED MOTOR
* ADJUSTABLE FEED HANDLE
* 9¼" THROAT CLEARANCE
* 15"x21" TABLE WORK SURFACE WITH T SLOTS
* SPINDLES SHIELDED DURING INDEXING OF TURRET HEAD
* ONLY SPINDLE IN OPERATION TURNS



The Burgmaster enables one operator to do the work of two or three and get the job done faster, better. A variety of jobs can be handled without moving the work piece from the machine table. It is simple to set up, requires but 6 square feet of floor space and is powered by a single motor.

Burgmaster users will tell you that their Burgmaster is the most economical machine in their shop, and pays for itself in a short period.

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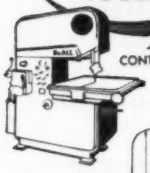
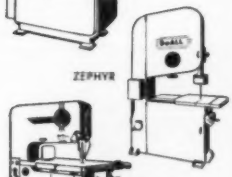

CONTOUR-MATIC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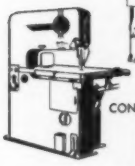
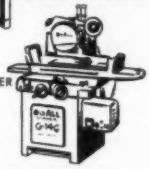
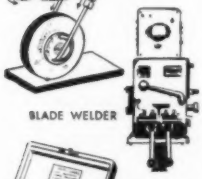

CONTOUR

BAND FILER

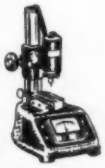
TOOLROOM GRINDER


CRUSH GRINDER

"COOL GRINDING" ATTACHMENT


BLADE WELDER

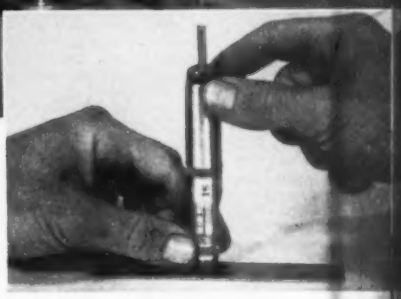
GAGE BLOCKS


GAGE ACCESSORIES

VARIABLE SPEED DRIVES

SAW BANDS

G. N. Krouse, owner of Krouse Testing Machine Co., Columbus, Ohio, inspecting 5" micrometer scales after "Cool Grinding" on DoALL Model G-1 Surface Grinder. These scales with .001" taper from end to end are held to accuracy of .00002" (20 millionths of an inch). Their micrometers and scales are used to measure plating thickness.



DoALL COOL GRINDING

U.S. Patent No. 2470350

(Coolant-through-the-Wheel)

This patented technique used with a DoALL Surface Grinder opens an entirely new grinding era—faster, more accurate, better finishes.

1. Cooler grinding temperature.
2. Full visibility of work. No mess.
3. Longer wheel life—less "loading," less frequent dressing.
4. Finer finish—no cracking, warping or "skin softness".
5. No special wheels required, no power consuming pumps, no space taking tanks.

SEE HOW IT WORKS. Interesting because it's so revolutionary. Call your local DoALL Store today and ask for a demonstration.

"Cool Grinding" on the DoALL Super Precision Grinder (7 models available).

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The DoALL Company

Des Plaines, Ill., U.S.A.

Cable Address: DoALL, Des Plaines

DoALL Stores in Key Cities

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Up to 50% production increase on large hole tap jobs!

—with NEW Procunier "TAP KING" Heavy Duty Tap Head

This revolutionary new Procunier "TAP KING" will change every idea you've ever had about *large hole* production tapping! More and more users are finding that it slashes costs . . . makes possible sensational increase in production on difficult large hole tapping jobs! Spectacular daily *production gains have run as high as 50% to 100%!* In addition, users reported amazing savings in parts spoilage and consistent, accurate maintenance of uniform tap depth . . . even on large *blind hole* tapping jobs!

Construction features include: capacity $\frac{3}{8}$" to 1" in steel and $1\frac{1}{16}$" in softer materials; powerful friction clutch, exclusive spline drive to tap holder spindle; ball and needle bearings; rigid lightweight "TRU-GRIP" tap holder; helical back gear reversing mechanism; lightweight aluminum housing and many other unusual advantages.

NEW! LARGER!
Procunier "TRU-GRIP" Tap Saver
Compact size makes tapping easier close to walls or shoulders, eliminates "chewed" tap shanks. Lighter, smaller in diameter, it drives the tap by the square, holds it true by the round.

PROCUNIER SAFETY CHUCK CO.
Dept. 3, 14-18 S. Clinton St.
Chicago 6, Illinois

Gentlemen: Please send me full details on the new Procunier "TAP KING" Heavy Duty Tapping Attachment.

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CITY .....ZONE....STATE.....

Here is the answer to your toughest large hole tap problems . . . write for full details today! PROMPT DELIVERY.

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Refer To . . .
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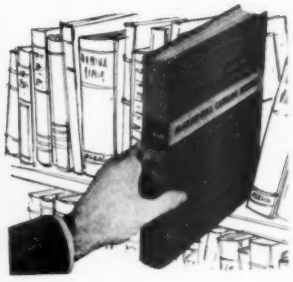

When the need for an electrical product arises in your plant.

Hundreds of pages of manufacturers' buying information on electrical items *exclusively* will help you compare, and determine source of supply.

The directory sections list all known manufacturers, classified alphabetically and by product.

If the Pre-Filed ELECTRICAL CATALOGS are not available for buying reference at your plant, write to:

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There is no charge to qualified users.

From the *American Machinist* Library of *Tips for Top Shop Men*

DON'T underestimate the effect of an unsound sales budget on production efficiency. Inaccurate forecasts mean fluctuating schedules, a changing work force, and low worker morale.

ARE you lugging materials to and from a machine for a minor operation that should be done where the material is? Check facing to length, centering, cut off, plain grinding. If volume is large, it may be cheaper to move the machine once and for all rather than moving the material continuously.

Straightening Time Cut 66%

in Steel Fabricating Plant by Using a Standard Model Dake Press

When a steel fabricating company recently sought a faster method for straightening I-beams and channels after welding, first reports indicated that a high-priced bulldozer would be required or that special equipment would have to be built for the job.

Dake engineers advised otherwise: "If you will equip our regular 50PA Air-Operated Press with a special table and screw nose," they said, "you should be able to materially reduce your straightening costs on all of your structural work." They bought the press and adapted the press to the job. (See illustration above.) The result . . . straightening time was sliced 66%; and they tell us the press paid for itself in the first two months of use.

If you have any kind of straightening, bending or pressing jobs where pressure is to be applied to metals, plastics, wood, etc., consider a regular Dake press first. If a regular model will not work satisfactorily, we will tell you so and will be glad to quote on custom-built equipment.

The complete line of regular-model Dake presses is illustrated and described in the folder which we invite you to send for . . . now.

Write for this Folder

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PRESSES

Single Leverage

Ratchet Type

Combination

Elec-Draulic

Hand-Operated Hydraulic

For repetitive cutting . . .

THIS COMBINATION SAVES TIME AND MONEY

Wells No. 12 Metal Cutting Band Saw and *Wells-O-Bar* Feed Master

ANY quantity of identical lengths of bar stock are cut automatically in a Wells No. 12 Heavy Duty Metal Cutting Band Saw equipped with a Wells-O-Bar Feed Master.

In operation, the cutting head of the saw descends at a rate governed by a predetermined blade pressure setting. At the completion of each cut, the head automatically rises to a preset height and the stock is automatically projected for the next cut. The machine requires no attention except for reloading. The saw is powered by two electric motors (3/4 and 1/3 H.P.); the feed requires air at 60 to 80 psi. Capacity of the saw is 12¾" O.D. for rounds, 12" x 16" rectangular; standard feed will project up to 17".

The feed mechanism does not interfere with the use of the saw for making single cuts. Saw and feed can be purchased separately or as a combination. The feed unit can easily be attached to horizontal band saws now in service.

Ask your Wells Dealer for complete information or write direct.

Wells Saws

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WELLS MANUFACTURING CORPORATION
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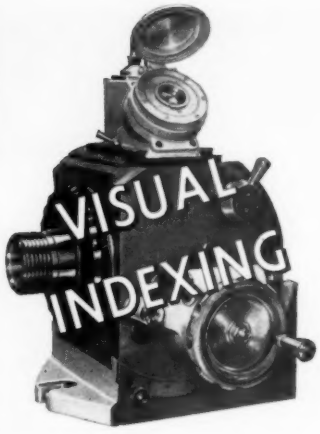

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One of a multitude of possible applications for the Baker 15 x 16 Hydraulic Unit is this new Baker single end horizontal trunnion type indexing machine with 7 stations, which is capable of an estimated hourly production of 652 pieces at 100% efficiency. Operations include drilling, facing, chamfering and tapping. Chutes are provided (see arrow) for the parts which are automatically ejected from the fixture into conveyances. The new Baker features automatic clamping by hydraulics, tapping with individual leadscrew tapper and outside portable hydraulic pump sump unit. Write Baker regarding your specific job problems.

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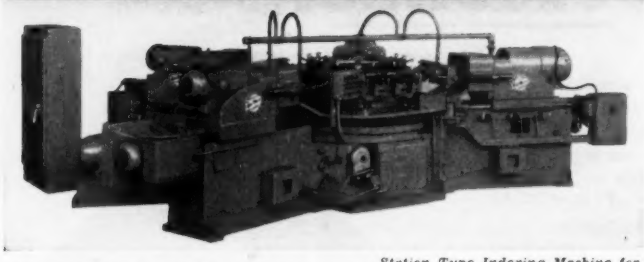
Drilling and Reaming

388 KING PIN HOLES PER HOUR



Station Type Indexing Machine for drilling and reaming king pin holes.

On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION INDEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

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2. Drill .823" dia. — Balance of way through.
3. End Cut Ream .8547/.8550" — Full length of hole.
4. Finish Ream .8635/.8637"—Full length of hole.
5. Load and Unload.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

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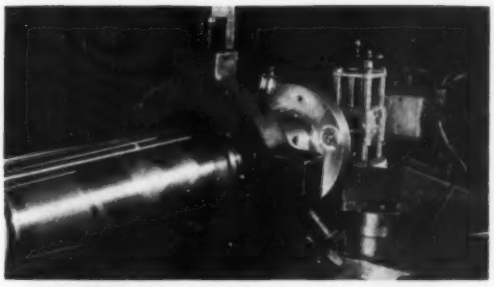
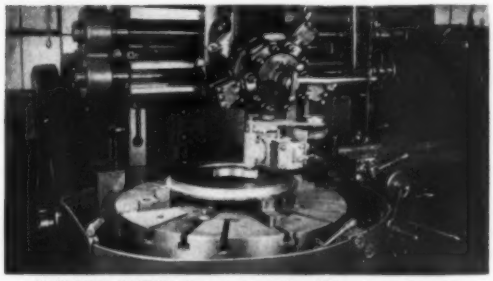
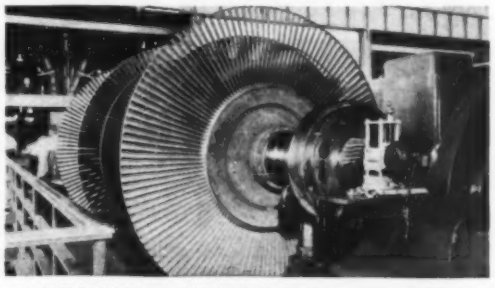


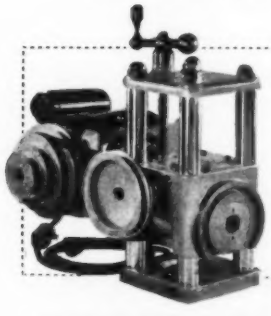
MACHINING DIFFICULT PIECES: Back spot facing coupling holes on a large heavy shaft, 13 ft. long x 9 in. diameter, with complete freedom from chatter on 3" diameter cut.



CYLINDRICAL GRINDING: By mounting Versa-Mil on vertical turret lathe or other large machine tools, cylindrical grinding on pieces beyond the capacity of most lathes is readily performed.



TAKING THE TOOL TO THE WORK: Removing ¼" (in one pass) from face of vanadium-steel turbine-coupling. By machining in turbine room, downtime is reduced from 2 weeks to 2 days.



Versa-Mil Basic Unit
6" travel on posts
#3 Morse taper
6" x 6¼" base
Weight: 89 lbs. with ½ hp. AC motor
104 lbs. with ¾ hp. AC motor

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Many of these companies and also others have re-ordered additional units again and again!

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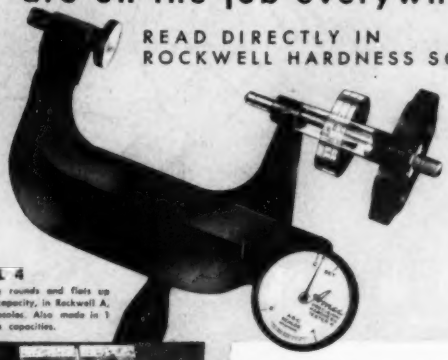

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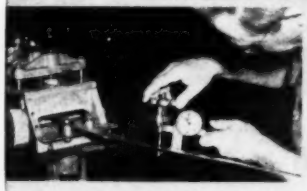

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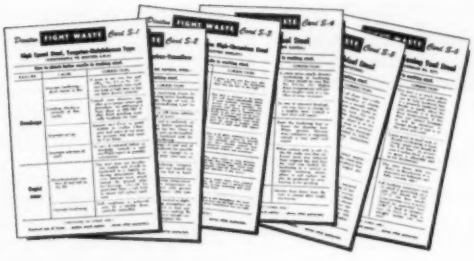

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From the *American Machinist* Library of *Tips for Top Shop Men*

SPECIAL jobs take special doing. They're the most profitable places to try special tools, special coolants, special operators. Too often the tendency is to be content with any method that will do the job at all.

STUDY merchandising's technique for introducing a new product. It'll pay you to try the same methods when installing new equipment. You'll avoid resistance not only from workers but also from foremen.

COMPARISON PROVES the VALUE of VEELOS

the Adjustable V-Belt...

IF you use v-belts you'll be interested in this clear statement of facts about VEELOS, the link v-belt, and endless v-belts.

These 4 reels of Veelos provide up to 316 standard v-belt sizes.

COMPARISON TABLE
VEELOS and ENDLESS V-BELTS

what about...	Veelos V-Belts	Endless V-Belts
ADJUSTABILITY	*Any* length can be provided for *any* v-belt drive due to link construction.	Standard or special lengths must be supplied for *individual* drives.
INVENTORY	MINIMUM INVENTORY. 4 reels can care for every v-belt need in the O, A, B and C widths. No deterioration or obsolescence of spare belts.	LARGE INVENTORY. 316 sizes are required to provide a *complete* stock in the O, A, B and C widths. Spare belts not immediately used will age and deteriorate.
STOCKROOM STORAGE	SMALL SPACE. It takes less than 2 square feet of wall or floor space to store 4 reels of easily identified Veelos.	LARGE SPACE. Walls and ceilings are often covered with stocks of endless v-belts. Identifying and maintaining full stocks is difficult and costly.
INSTALLATION	Installs quickly *on any drive* without resetting motor or tearing down outboard bearings.	Necessary to reset motor and tear down drives with outboard bearings.
MAINTENANCE	Belts can be adjusted or replaced without moving the motor.	Sliding or pivoted motor bases are necessary to replace endless v-belts. Belts cannot be adjusted individually.
OPERATING EFFICIENCY	Full power delivery can be maintained because the tension of each belt in a matched set is kept uniform by removing or adding links.	Individual belts cannot be adjusted to maintain uniform tension and provide full power delivery.
DRIVE LAYOUT	No limitations are imposed by belt length.	Limited by the availability of standard or special belt lengths.

If you would like to learn more about Veelos—how it can save you money and keep your machines producing—write today for your copy of the Veelos Data Book. It's free and full of facts!

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PENNSYLVANIA

VEELOS
THE LINK
V-BELT

... ADJUSTABLE TO ANY LENGTH ... ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof and static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

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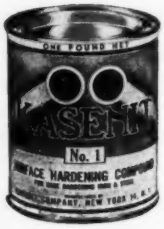

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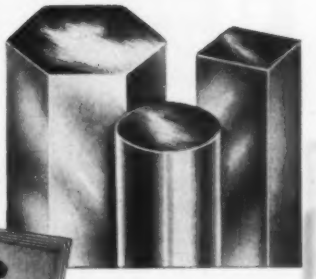

Maybe you haven't gotten the word yet, but more and more machinists are "discovering" Jalcase 10 (A.I.S.I. No. C-1144), the top grade of J&L Cold-finished Jalcase. And they're getting good results, too! Here's why.

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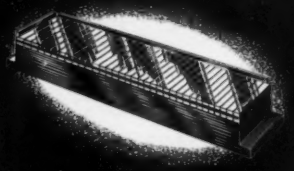
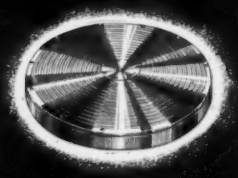


RECTANGULAR . . . work held to extreme edges of chuck. Sizes to 36" x 96".



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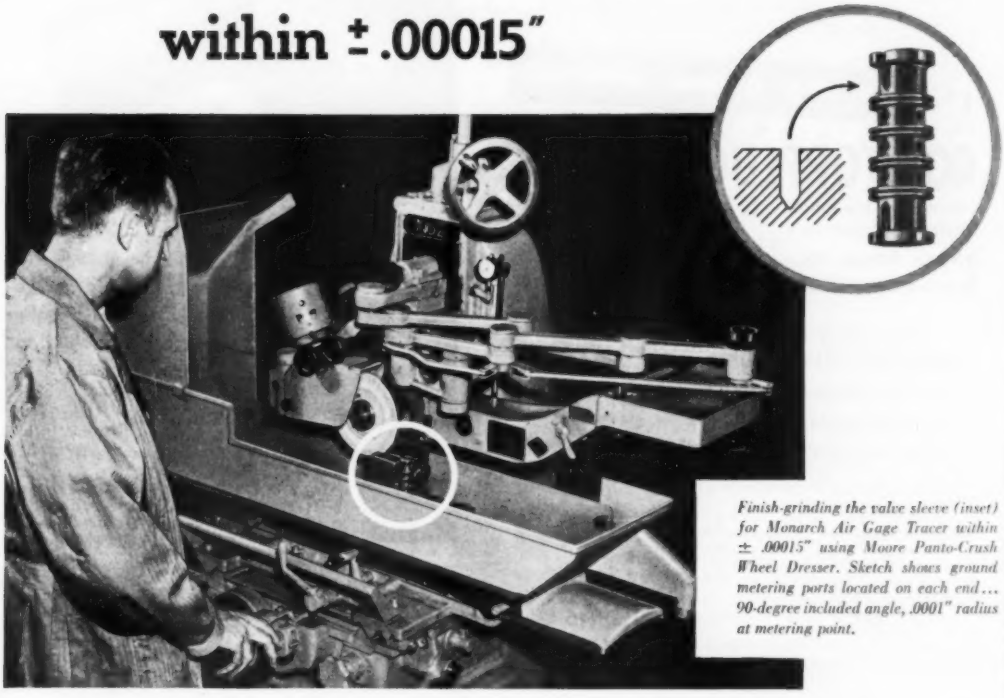
TWO of management's most important words are "know" and "no." If you're strong on the first, you seldom hear the second.

Moore Wheel Dresser Keeps Monarch Air Gage Tracer Part within ± .00015″



Finish-grinding the valve sleeve (inset) for Monarch Air Gage Tracer within ± .00015″ using Moore Panto-Crush Wheel Dresser. Sketch shows ground metering ports located on each end... 90-degree included angle, .0001″ radius at metering point.

1951's machine tools produce with unprecedented speed and accuracy because advanced tools fabricate their complex new operating features.

Take tracer-controlled duplication machining, pioneered by the Monarch Machine Tool Co. of Sidney, Ohio. Every component of the Air Gage tracer hydraulic valve for Monarch lathes is completed to tolerances ranging from .0001″ to .0003″ in what Monarch employees call their "Tenths Room."

An important part of this room is the Moore Panto-Crush Wheel Dresser*. Mounted on a surface grinder, it makes possible the finish-grinding of the metering ports on each end of the valve sleeve. These ports have a 90-degree included angle with a ten-thousandths radius at the metering point. Depth must be held to plus or minus .00015″.

No other method could accomplish this as quickly and accurately as the Panto-Crush Wheel Dresser. This unit *combines* crush-forming and diamond dressing. Either method is immediately available. Switching from one to another disturbs neither the work-setting nor the location of either truing device with respect to the wheel or workpiece.

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*Another is a Moore Jig Borer.

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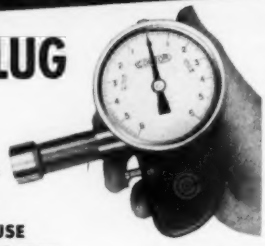

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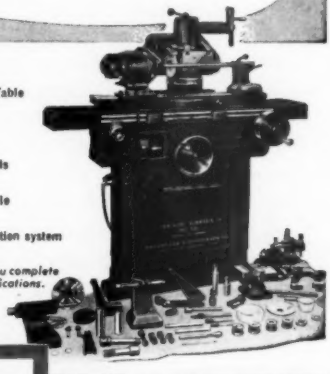

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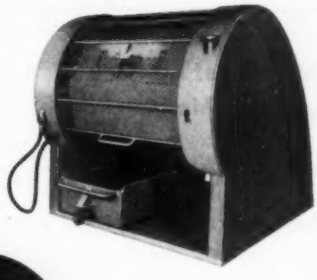
Tumbling Aids World War II Production

It was at about this same time that manufacturers became occupied with defense, and, shortly later, war production. Tumbling was a natural answer to the extreme demands put upon producers to step-up de-burring operations. The faster tempo of increased manufacturing could not be satisfied by old fashioned, hand applied methods. Tumbling with chips and compounds broke this bottleneck, because it could do the job not only faster with less labor, but could do it as accurately or more so than by hand. Standardized procedures were established, based on the experience of using certain types and sizes of chips, and various compound preparations on different kinds of metal parts. Savings were made over hand methods by as much as 80% on work for aircraft, electronic, naval, munition, and military vehicle production.



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By employing the Grav-i-Flo process, manufacturers will achieve even greater savings in de-burring parts for defense items than in the former preparedness program. Those producers handling defense contracts should investigate the possibilities of Grav-i-Flo for their work. The Grav-i-Flo Corporation will process samples free to show how your parts can be deburred at substantial savings! Send samples direct to The Grav-i-Flo Corporation.

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Producers of top quality carbide for cutting tools, dies and wear resistance

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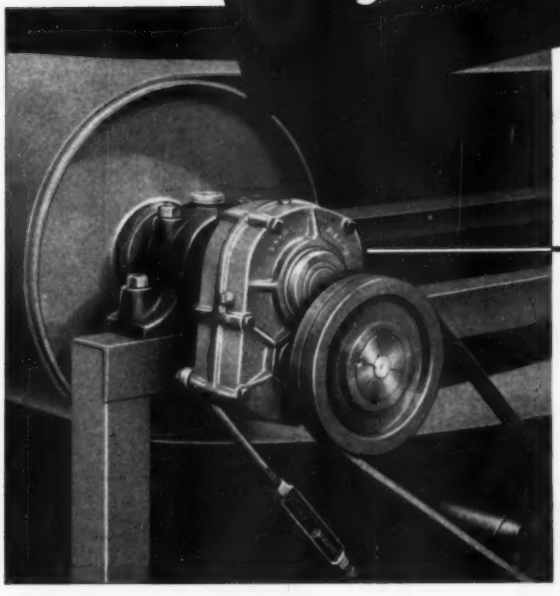

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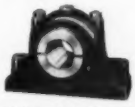

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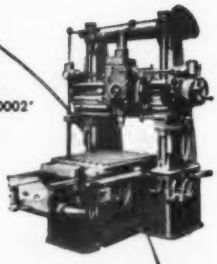
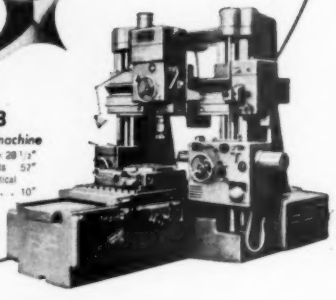
Boring capacity . . . . . 9"
Guaranteed accuracy: .0002"



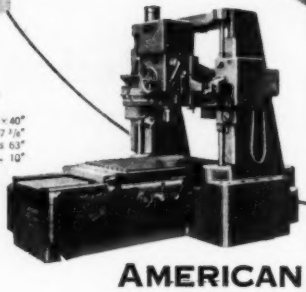
No. 2H
Working range . . . . . 16" × 10"
Table top to spindle end . . . 19"
From spindle axis to column 13 7/8"
Boring capacity . . . . . 1 9/16"
Guaranteed accuracy: .0001"

SIP

Hydroptic-8
Three-coordinate machine
Working range 55" × 40" × 28 1/2"
Free space between uprights . 57"
Boring capacity of both vertical and horizontal spindles . . 10"
Guaranteed accuracy: .0002"



Hydroptic-7
Working range. . . . 55" × 40"
Table top to spindle end . 37 7/8"
Free space between uprights 63"
Boring capacity. . . . . 10"
Guaranteed accuracy: .0002"



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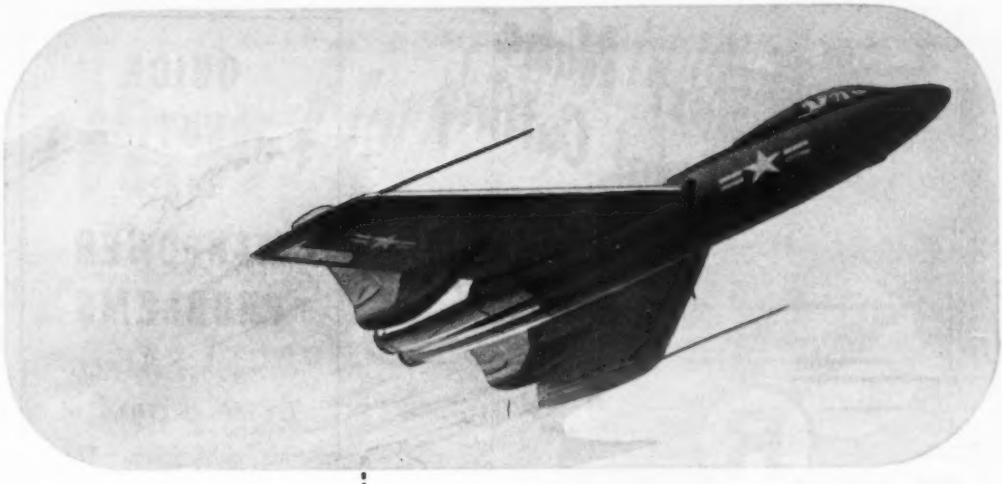

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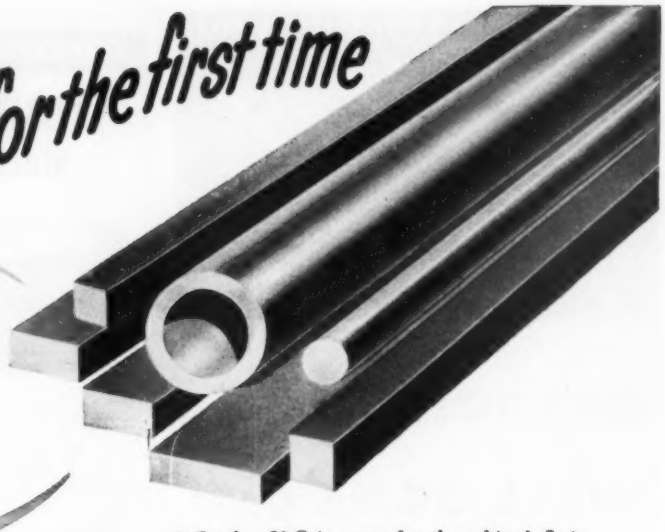

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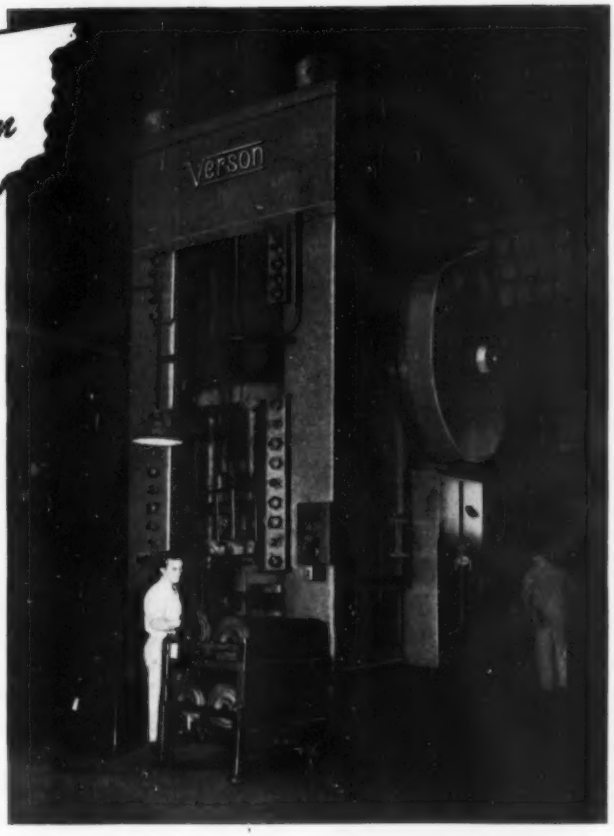
Can you match these production figures?

THIS Verson KNUCKLE JOINT PRESS forms 260 flywheels per hour



In the plant of a leading automobile manufacturer, the 2000 ton Verson Knuckle Joint Press illustrated stamps out automatic drive flywheels at the rate of 260 per hour. A flat blank is transformed into a flywheel ready for machining in a single operation in less than 14 seconds!

The acceptance of press forming of precision parts under tremendous force is growing rapidly. By using the knuckle joint's characteristic of applying high pressure over a concentrated area it is often possible to produce superior quality parts at a substantially higher rate and at a fraction of the cost of conventional methods.

Verson Knuckle Joint Presses meet all requirements for work of this type. Their rugged, all steel construction in combination with Verson design gives them the accuracy, power, speed and dependability so vital to this type of service. Write for complete details outlining the nature of your problem.

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For uninterrupted production use quick-change AMF Wahlstrom Chucks—the only *fully-automatic* drill chucks holding widest range of straight-shank tools...Model A—1/32" to 1/2"...Model AA—1/64" to 3/8"...Model B for larger straight-shank tools...Model C for taper-shank tools and fully-automatic tappers.

***See your local distributor or write for Bulletin* 56-5.**

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amf ***fully automatic***
CHUCKS

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From the *American Machinist* Library of *Tips for Top Shop Men*

TAKE a man's pride in his job away, and there isn't much left; he becomes another automaton. Even a trained seal enjoys the applause as much as he does the fish.

WHEN you walk the tight-rope between close tolerances, or between good and bad finish, balance is vital. Be sure you have it, in machine-tool spindle or shaft, in tooling, in fixture. It will pay out in longer tool life and reduced scrap.

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At least one billion dollars a year in labor costs are being wasted in Metalworking right now . . . money which can be saved by eliminating inefficiencies in machining operations.

A recent *American Machinist* Special Report, "How to Stop That Waste in Machining," reports fully on this important subject . . . and should be must reading for any production executive who wants the facts with which to back up his requests for new and better machines to work with.

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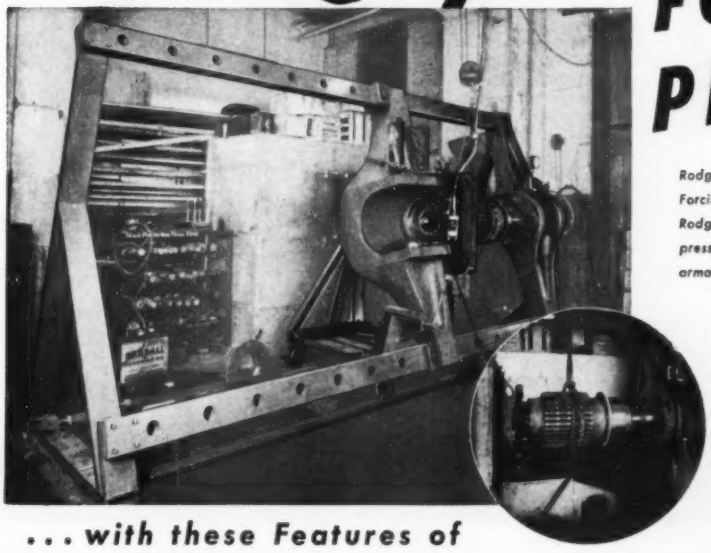
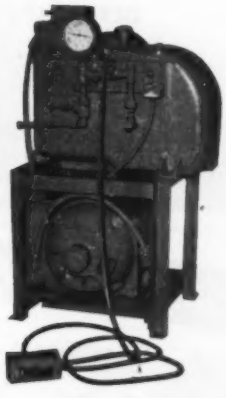
New Rodgers FORCING PRESSES



Rodgers 300 Ton, 75° Inclined, Stationary Forcing Press, one of many in the complete Rodgers line. In the application shown, the press is being used efficiently to press an armature shaft.

. . . with these Features of Construction and Operation

- **SEPARATE PUMPING UNITS**—Choose from individual hand-operated or power-driven pumps to operate any model Rodgers Forcing Press.
- **REMOTE CONTROL OF POWER PUMPS**—Operator can control press from any desired position.
- **REMOVABLE HYDRAULIC CYLINDER**—Cylinder is easily removed from head member to permit servicing or use for other power applications.
- **INDIVIDUAL FRAME UNITS**—Tracks, tension bars, abutment member and head member are all separate units to facilitate handling and erection of press.
- **EXPERTLY ENGINEERED AND CONSTRUCTED**—All units of Rodgers Forcing Presses are made strong, durable and dependable to give years of reliable service.



. . . Separate Power Pump

Select your press operating unit from hand-driven pumps or power-driven pumps. Shown is a Rodgers 2-cylinder Power Pump with remote control.

. . . In these Types and Sizes

Rodgers Versatile Forcing Presses are available in portable or stationary models—horizontal, vertical, 75° or 90° inclined—100 to 600 tons—with hand-operated or power-driven pumps. In this broad selection, you'll find the ideal press to meet your requirements.

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For full details and specifications on the complete line of Rodgers Forcing Presses send for Catalog 315.

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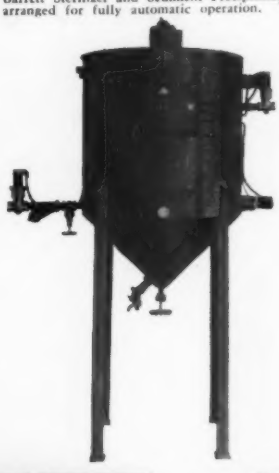
with the NEW BARRETT COMBINATION STERILIZER AND SEDIMENTOR for CUTTING OILS . . . .

Barrett Sterilizer and Sediment Precipitator arranged for fully automatic operation.



Protects your operators against infection—insures more and better work from your cutting tools—by sterilizing your cutting oils and precipitating sediment *at the same time.*

The NEW BARRETT STERILIZER AND PRECIPITATOR combines these two operations in one piece of apparatus which can be depended on to handle both operations effectively, efficiently and economically. Sterilization is by heat and is a positive active operation in the line ahead of the supply tank. By locating in this position, contamination is intercepted before the cutting oil is conditioned for safe, bacteria-free reuse.

Because of the heat to which the oil is subjected during sterilization, the viscosity of the cutting oil is reduced, thereby encouraging precipitation of minute heavy particles. The sediment thus liberated settles out and drops by gravity to the bottom of the sterilizer where provision is made to scrape the precipitated solids from the conical bottom and clean them out.

By thoroughly and constantly sterilizing and effectively removing solid matter, the Barrett Combination Sterilizer and Sedimentor reconditions cutting oil for reuse; sterilized for safety's sake and abrasive-free for longer tool life.

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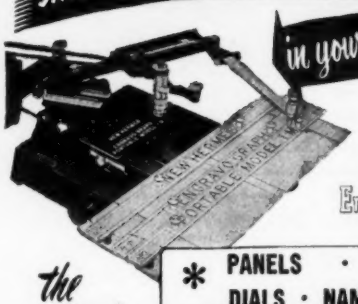

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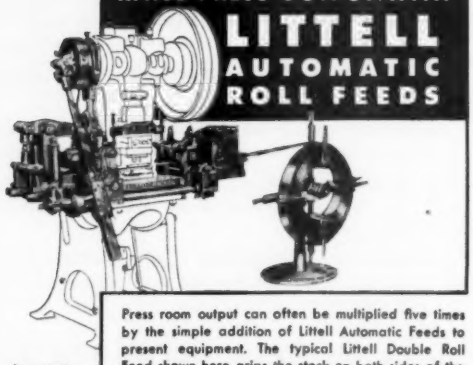

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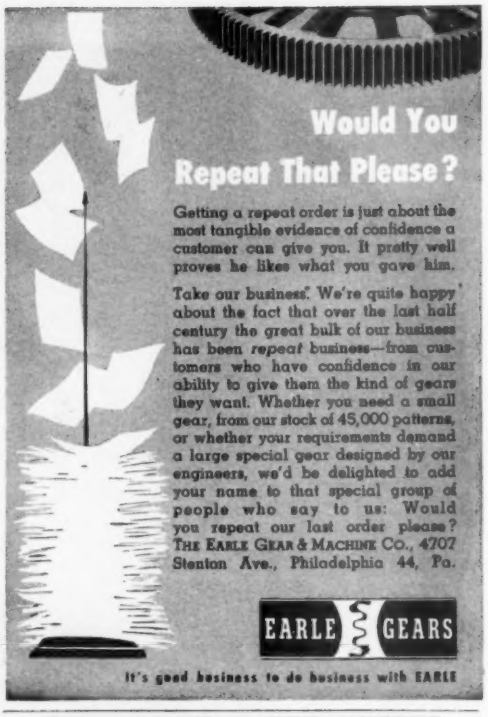

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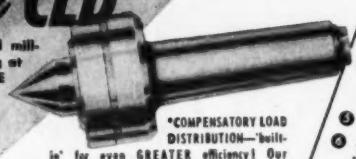

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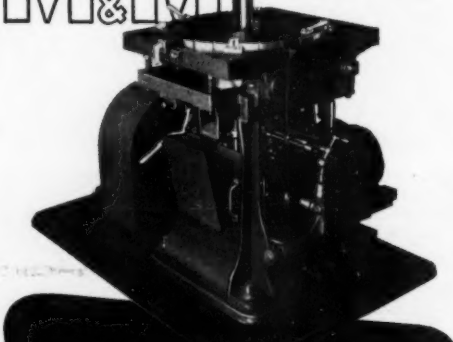

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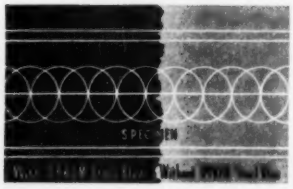

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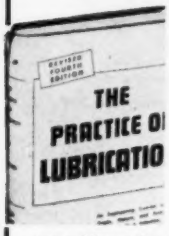

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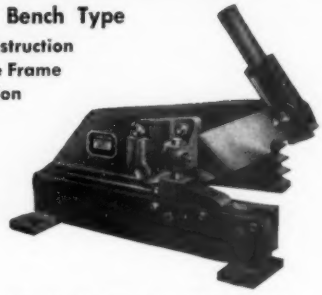

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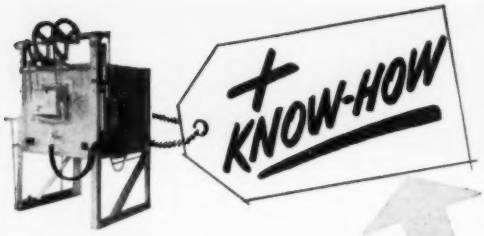

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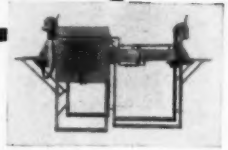

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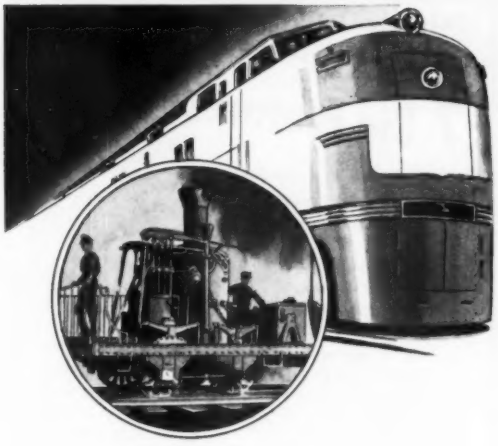

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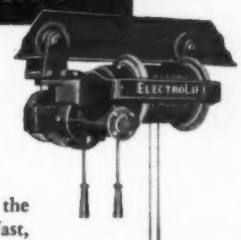

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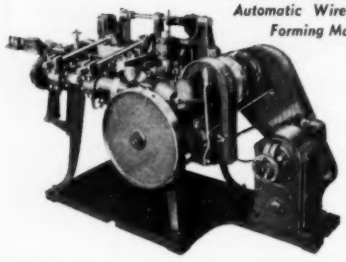

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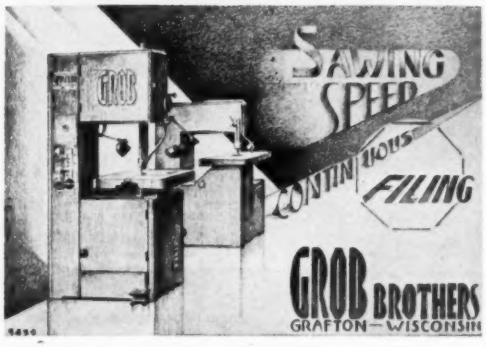

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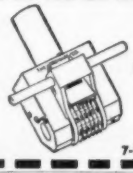

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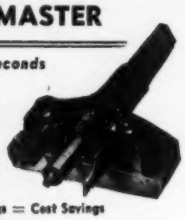

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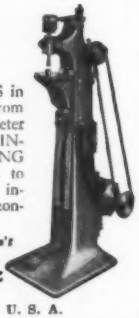

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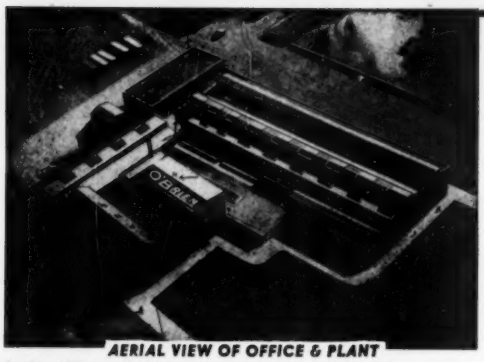

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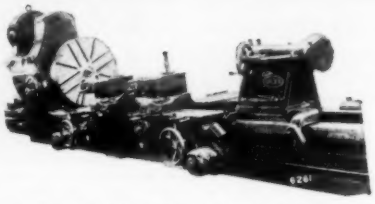
THREAD MILLER, Hanson Whitney Univ. Semi-Automatic.
THREAD MILLER, Loos Bradner #40A Automatic Chucking. 220/440 v.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, #40 Spdl. Timken Bearing. THY-MO-TROL Control Unit. 5 h.p.
PIPE THREADER, Williams #3, 1½" to 6".
BOLT THREADER, Hill-Acme #1½-C Sgle. Hd.
TAPPER & THREADER, W & S #11R Dual Radial. Motor and Tooling.
TAPPER, W & S #1 Sgle. Spdle.
POWER PRESS, Bliss #164 Open Back S.S.S.A. 60 tons, 4" Stroke.
POWER PRESS, Bliss #84 S.S.S.A. 56 tons, 10" Stroke, 20" between uprights.
POWER PRESS, Bliss #75½ S.S.S.A. 120 tons, 5½" Stroke, 24" between uprights.
POWER PRESS, Bliss #3A S.S. Dble. Crank B.A. Grd. 45 tons, 4" stroke, 36" between uprights.
POWER PRESS — Bliss - Consolidated #163 - B Straight Side Dble. Crank Single Action, 45 tons, 6" stroke, Bed area—24" x 41", 15 h.p. 220 motor.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Federal #2 O.B.I. 2" Stro.
PRESS, Federal #3 O.B.I. Grd. 4" Stro.
PRESS, Federal #4 O.B.I. Grd. 3" Stro.
SAW, Band, Tannewitz #GH-36" High Speed.
GEAR SHAPER, Fellows #72 High Speed.
SHAPER, Vert., Pratt Whitney #B—6" Motor Dr.
SHAPER—Columbia 32" B.G. Crank.
SHEAR, Squaring, Wysong & Miles #572-A, 6'x 14 ga. All Gauges & 220/440 motor.
SHEAR, Quickwork #A-1 Rotary 60" Throat. 18 ga.
WELDER, Federal #712 AT Motor Driven Toggle Action Projection. New in 1938. 200 KVA, 10" throat. Stroke—1" to 2". With controls.
WELDER, Federal #824B Hvy. Duty Grd. Type 75 KVA. 1½" Stroke. 17" throat. Motor driven.

SIMMONS ENGINEERED Machine Tool REBUILDING NEWS

SIMMONS MACHINE TOOL CORPORATION • MAIN OFFICE AND PLANT, 1759 N. BROADWAY, ALBANY, N. Y.



42"x42' (32' centers) NILES Heavy Engine Lathe with two carriages, with compound rests with power angular feed. Power Rapid Traverse. One Taper Attachment. Forces Feed Lubrication to headstock. Swing over carriage bridge 35½". RH and LH carriages. Norman spindle speeds RPM 2 to 300. Inspect at Albany.

HAVE YOUR MACHINE TOOLS REBUILT THE SIMMONS WAY

1.) Take a *physical* inventory of your machine tools, particularly the heavy, hard-to-replace ones.

2.) Select those in need of rebuilding or modernizing that can be spared temporarily.

3.) Call on Simmons to see the program through by *Engineered Rebuilding* in the world's largest, best-equipped plant.

Write Today for a Complete Current Stock List of Simmons Engineered-Rebuilt Machine Tools.

NEW YORK OFFICE — 50 EAST 42ND STREET
PHILADELPHIA REPRESENTATIVE—PHONE—VICTOR 8-3133 . . . PITTSBURGH REPRESENTATIVE—PHONE—PENHURST 1-3700

NOW YOU CAN START THAT CRANKSHAFT JOB

with these NORTON crankpin grinders

Available for immediate delivery!
Two NORTON CRANK-O-MATIC

Many other machines you need come in each day. Tell us your needs. If we can't fill them from stock, we'll comb the country to find them for you. Finding good machine tools is our business, and we know our business well.

17" x 42" Crankpin Grinders,
Model D 86; right hand head adjustable.
Fully automatic, with double-end drive.
Built in 1944, hardly used.
With many accessories.

Machine Tools
LAURENS BROS., INC.
3780 HIGHLAND AVE
CINCINNATI 12, O.

FOR SALE

2A WARNER & SWASEY TURRET LATHE—3½" Cap.

Rebuilt in 1940, Serial Number 492,103. Chucker and Bar Feed. Power Rapid Transverse on Saddele. A/C Motor 220/440.

This machine is in New Condition.

Price $4950.00

Subject to prior sale.

H. P. MANDEL & SONS
2840 South Kedzie Ave., Chicago, Ill.
Bishop 7-7890

GEARS AND SPLINES

Type GG-35 GEARGRIND—18" External, Hyd. Table Stroke 27" New 1942—220/440/3/60 Elec.

ROSENKRANZ, WEISBECKER COMPANY
149 Broadway New York 6, N. Y.

AVAILABLE

MODEL GCJ, RED RING GEAR SHAVER, Serial #583, New 1942; Capacity O.D. 4" to 36".

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advertising your used or surplus new equipment in the Searchlight Section you turn it into CASH.

"SEARCHLIGHT" is the recognized national center for the buying and selling of such equipment.

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Classified Advertising Division

American Machinist

330 W. 42nd St., New York 18, N. Y.

MUST VACATE BUILDINGS AT ONCE!
HEAVY MACHINERY *and* SHEET METAL EQUIPMENT

Immediate Delivery ***Still in Original Location***

NO REASONABLE OFFER REFUSED!

SHEARS

CLEVELAND Vert. Trimming; type #443 cap. ½"x10"
FERRACUTE PG-4, 1½" stroke
GARRISON Gate; cap. 1"x132"
LONG & ALLSTATTER Gate; "A" ¾"x60"
LONG & ALLSTATTER Bolt; ½" rd.
MACKINTOSH HEMPHILL Bar; 3" rd.
P.S.C. CO.—plate—½"x48"

PRESSES—Hydraulic

BETHLEHEM 1200 ton; 68" stroke
MACKINTOSH-HEMPHILL (Upward) strokes 60", 36", 30", 24"
NILES-BEMENT-POND 4-post, 30" stroke w/ intensifier
PRESSED STEEL 21", 22" strokes
WOOD 750 ton—5'x12'

PRESSES—POWER

acISS No. 10A, 12" stroke, 450 tons
aSLISS No. 15, 20" stroke, 1200 tons
FERRACUTE 100 ton cap., 10" stroke
TOLEDO No. 88 single crank

PUNCHES

HILLES & JONES No. 2 Horiz. 1½" strk. cap 1½"
HILLES & JONES No. 3 Vert. 2½" strk. cap 1" dia.
HILLES & JONES No. 2 Horiz. 1¼" stroke cap 1⅛" dia.
HILLES & JONES No. 3 Horiz. 1⅝" stroke, cap 1⅛" dia.
HILLES & JONES No. 3 Dble. Hd. Vert. 2" stroke, cap. 1⅝" dia.
HILLES & JONES No. 3 Dble. Hd. Vert. 1¾" stroke, cap. 1⅝" dia.
HILLES & JONES No. 2 Vert. 1½ stroke, cap. 1¼" dia.
LONG & ALLSTATTER No. 2 Vert. 1½" stroke, cap. 1" dia.
LONG & ALLSTATTER Size B Dble. Hd. Vert. 2" stroke; cap. 1" dia.
LONG & ALLSTATTER No. 3 Vert. 1½" stroke, cap. ⅞" dia.
CLEVELAND Mult. type w/ spacing table; 3" stroke
CLEVELAND No. 1 Mult. 6" stroke
CLEVELAND Vert. 500 ton IX; 6" strk.
CLEVELAND Mult. 3"x120"
CLEVELAND EF Vert. 1½" stroke
CLEVELAND Type C Vertical; 1½" stroke
CLEVELAND Type C Dble Hd Vertical 1¼" stroke
CLEVELAND Type Z Punch & Bar Shear 4" stroke
CLEVELAND No. 1 Mult. Angle 2½" stroke
CLEVELAND "C" Dble. End; 1⅜" stroke
CLEVELAND Vertical No. 30 IX, 3" stroke
CLEVELAND Type A-1 Horiz. 1⅝" stroke
COVINGTON Mult. 6" stroke
COVINGTON No. 2 Vert. 2" stroke
MASSILLON No. 5 Ver. 2" stroke
MASSILLON No. 5 Ver. 1½" stroke
MASSILLON No. 5 Vert. 1¾" stroke
WILLIAMS & WHITE No. 17 Vert. cap. 1⅛"
THOMAS No. 20 Mult. Movable bolsters and spacing table—3" stroke
SOUTHWARK Mult.; 400 ton, 7" stroke
MACKINTOSH HEMPHILL Vert. 2½" stroke

ROLLS—Bending

BERTSCH 8'-3/16" cap.

BENDING MACHINES

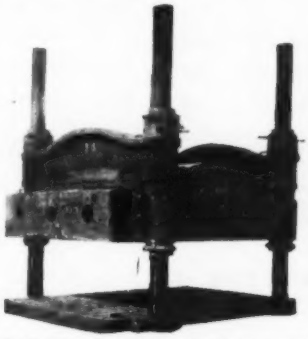
WILLIAMS & WHITE No. 2 Rail Bender 1¾" stroke

FORGING MACHINES—Upsetters

AJAX—Horizontal M.D. 1½", 2", 4", 5" cap.
AJAX Auto. Rivet; size openings 10x13

FORGING ROLLS

AJAX Brake Shoe Key
AJAX Lever Type



MILES 30" stroke hydraulic (Upward) Press with intensifier

BULLDOZERS—Horizontal

PRESSED STEEL CAR—Hydraulic
WILLIAMS & WHITE No. 2
AJAX No. 7; 20" stroke

WHEEL PRESSES—Hydraulic

NILES-BEMENT-POND XX 400 ton

BORING MILLS—Vertical

BICKFORD 22", 2 heads
NILES-BEMENT-POND 10-ft.

BOLT THREADERS

NATIONAL Double type—cap. 1"
NATIONAL Single type cap—2½"
LANDIS Double Head; cap. 2½"
LANDIS Double Head; cap. 2"

CENTERING MACHINES

WHITON 5"x8', 5½"x10' cap.
WHITON Double Spindle 4"x8' cap.

DRILL PRESSES—Single Spindle

BARNES 22", 28"
COLBURN D-2, D-4, D-5, D-6
BAKER w/ tapping attachment
PRENTIS 18"

DRILLS—Multiple Spindle

BAUSH 8 spindle, hd. 24x40"
MOLINE 6 spindle
NATCO No. 30, 12 spindles

DRILLS—RADIAL

PRENTISS BROS. 4'0"
WESTERN 6' low-hung (1943)

LATHES

BARDONS & OLIVER No. 1 (turret)
BOYE & EMMES 26"x12"; 26"x12"; 20"x13"; 18"x8'
LeBLOND 18", 17"x8', 21"x10', 28"x16'
SCHUMACHER & BOYE 20"x13'

MILLING MACHINES

JACKSON Vert. Mill & Die Slotter

PLANERS

CLEVELAND 48"x48"x12' Openside; 3 hds.
DETRICK & HARVEY 48"x48"x14' 4 hds.
DETRICK & HARVEY 42"x42"x12' 4 hds.
GRAY 36"x36"x8'; 2 hds.
NILES-BEMENT-POND 48"x48"x12' 4 hds.

HAMMERS

ERIE single frame 2500#, 1100#
ERIE double frame 4000#
CHAMBERSBURG double frame 800#, 900#, 1300#
NILES-BEMENT-POND double frame forging 3000#
BRADLEY Cushion Hovel 50#
BRADLEY strap type 200#
BRADLEY Upright hovel type 500#

RIVETERS—HYDRAULIC

CHICAGO PNEUMATIC mounted w/ stand
CHAMBERSBURG Pinch—die gaps 8", 10½", 11½", 11½", 13"
CHAMBERSBURG Deep Gap; die gap 23"
MACKINTOSH-HEMPHILL Deep Gap; gap 23"
NILES-BEMENT-POND pinch; die gap 9", 10"
WALKER pinch—die gap 14"
WOOD Deep Gap and Pinch, 10½", 12"

RIVETERS—PORTABLE PNEUMATIC

Approx. 75 machines:
Gaps from 3½" to 72"
Strokes from 2¾" to 10"
RYERSON, HANNA, ALLEN, BAIRD, WATSON-STILLMAN

CARWHEEL BORING MILLS

BETTS 48"; table dia. 52"

AXLE LATHES

NILES double head—2 roughers; 2 finishers
NILES double head Burnishers
PUTNAM Dble End Center Drive center dist. 9'
BRIDGEFORD center drive, double end—12½"x9'

PIPE MACHINERY

NATIONAL 1" double head
NATIONAL 2½" single head
LANDIS 2½" double head
LANDIS 2" double head

SAWS

HIGLEY No. 16—Cold, 20"
WRIGHT Band Hack, 15"10"
RACINE 6x6 high speed
ESPEN LUCAS Cold, 8" rd cap.
RYERSON 48" friction
GUSTAV WAGNER Cold; type D62, 22"
AJAX Hot Saw & Burring, No. 2

WELDERS—D.C. 230 V.

HOBART ARC, 12 KW 300 amps M.G. set
WESTINGHOUSE 400 amps Flex-Arc M.G. set
WESTINGHOUSE 75 KW 300 amps Arc M.G. set
WESTINGHOUSE 300 amps Flex-Arc M.G. set

WELDING POSITIONERS

RANSOME hand tilt and turn; 20" dia. table

TURBO GENERATORS

WESTINGHOUSE 1000 KW; 625 KW; 500 KW

TURBINES

STANDARD size 20 HP steam pressure 150#
STANDARD size 60 HP steam pressure 150#
TERRY; 75 HP and 125 HP
WESTINGHOUSE 50 KW; steam pressure 150#

TESTING MACHINES

TINIUS OLSEN Universal, cap. 600,000#
TINIUS OLSEN Cap. 50,000#

GRIT BLAST

PANGBORN type car blast, approx. 16'x28'x30'

PARTIAL LIST—**There are Air Compressors, Hydraulic Pumps, Grinders, Scales, Car Pullers, Woodworking Machines *plus* about $300,000.00 worth of SMALL TOOLS including Chain Blocks, Reamers, Drills, Milling Cutters, etc.**

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Nichol Avenue, McKees Rocks (Pittsburgh), Pa.

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EMERMAN OFFERS FROM STOCK

#1½B X 5" PRATT WHITNEY GUN BARREL RIFLING MACHINE

Range: max. rifling diameter ⅝"
max. rifling length 50"

4, 5, and 6 Grooves can be obtained with one standard index cam. An additional cam be required for 7 and 8 grooves.

Hole thru work spindle 2⅜"

Taper hole in Rifling spindle #2 Morse

2L GISHOLT UNIVERSAL SADDLE TYPE TURRET LATHE

Preselector Head—Extended Bed—Chucking Equipment.

#1½ PRATT WHITNEY 2 SPINDLE DEEP HOLE DRILL

Distance between spindle 13"

Center of spindle to face of table 4½"—9" swing.

Travel of head 30' 6"

With electrical equipment

FOOTE BURT VERTICAL HYDRAULIC

2 Spindle Drill

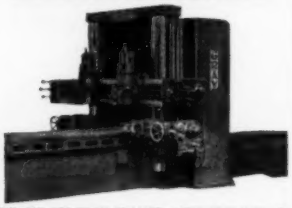
#5 MORSE TAPER—30" Diameter—3 Position Indexing Table.

BARNES H3 HYDRAM

24L 36 BRYANT HYDRAULIC INTERNAL GRINDER

EMERMAN MACHINERY CORP. 875 W. 120th St. Chicago 43, Ill.

LATE TYPE TOOLS IMMEDIATE DELIVERY

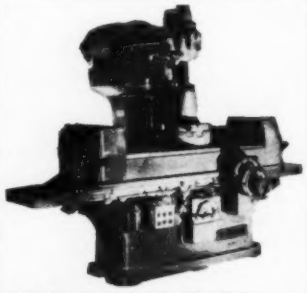


48"x48"x12' GRAY PLANER: NEW 1941 4 Heads, M.D.
NO. 4-A WARNER & SWASEY UNIV. TURRET LATHE: 12 Speed Geared Head, 28" swing; 12" spindle hole.
COLEMAN (EXCELLO) VERTICAL SHELL TURNING MACHINE: 2 side heads.
20"x60" C/C LODGE & SHIPLEY GEARED HEAD LATHE, T.A.
7' 16" AMERICAN TRIPLE PURPOSE RADIAL DRILL: No. 6 M.T.
18" EXTERNAL GEAR GRINDING MACHINE: NEW 1942; Type GG-35; 9"x40" table.
10"x36" CINCINNATI CYLINDRICAL GRINDER W6 BAUSH MULTIPLE SPINDLE DRILLING & TAPPING MACHINE: Hyd. Feed.

Only Partial Listing—
Over 2,000 Machines in Stock

PHONE YArds 7-5800

INTERSTATE *Machinery Co. Inc.*
1827 W. PERSHING ROAD CHICAGO 9, ILL.



P&W Vert. Hyd. Surface Gr. w/mag. chuck 18"x84", 75 HP on spdle, in stock	$12,500
GALLMEYER & L. #1½ Tool & Cutter 12x38"	1,250
CIN. #1½ Univ. Tool & Cutter table 30x5'	775
B&B #2 Univ. Toolroom, 12x38" Rebilt 48	1,590
CIN. #3 Centerless Gr. 10" face x 24" dia.	1,850
BRYANT #12 Internal Chucking, 8" dia x 12 deep	1,250
BSA Centerless—Late similar to Cin. #2	2,950
AUTOMATICS	
CLEVELAND Mod. B 5¾" new '47	12,500
CLEVELAND Mod. A 2" & 1¼" Excellent $1800 &	850
CLEVELAND Mod. A 7¾", single spdle	Offers
CLEVELAND Mod. B 1½" good condition	600
GRIDLEY Mod. F, 4 spdle ¾" & 1" Tooling	1,495
GRIDLEY 4¼" cap. 6 spdle, tooling	2,900
B&S #0, belt drive, Tooling	995
ACME #52 ¾", #53 ⅞", #55 1⅛", #56 2¼" 4 spdle complete w/tooling ...up	1,495
DAVENPORT 1 spdle Mod. B3, ⅝", new '42	1,850
WORRELL 5/16" cap. Form, cut off & dr. '43	1,250
JIG BORERS & MISC.	
KELLER Duplicator, Mod. G, Motorized	5,500
MOORE No. 211 Jig Borer, complete w/equip.	5,500
LIBBY 7¼" hole in spdle, geared hd.	2,500
P&W Production Miller 6" & 8", M.D. ea.	1,200

EVEREADY CO. E. J. McCALLUM, Prop.
805 Housatonic 4-9471 Bridgeport, Conn.

1—Model AR—7"x60" Seneca Falls Low Swing Automatic Turning Lathe with 40 HP.—1800 RPM.—220/440 Volt, 3 Phase, 60 Cycle Driving Motor and Accessories. (1948)

1—#56 x 72" Sundstrand Double End Drilling and Centering Machine ½" x 6" Diameter Capacity with 3 HP.—1800 RPM., 220/440 Volt, 3 Phase, 60 Cycle Motor and control complete with #20 Jacobs Chucks, Spindle Adaptors and Coolant Pumps. (1948)

1—Bear Model 340, Type R, 4' Bed Length, Bench Model, Industrial Static and Dynamic Balancing Machine with ¼ HP., 110 Volt, Single Phase, 60 Cycle Motor complete with Atlas Radial Drill with 1/3 HP. Motor. (1948)

Each of these machines are in excellent condition with less than 1000 hours of operation.

VONNEGUT MOULDER CORPORATION
1815 MADISON AVENUE
INDIANAPOLIS, INDIANA

FOR SALE

1—#456-A Gear Tooth Vernier with case. 20 D.P. to 3 D.P.

1—#122—24" Vernier Caliper with case.

TILLERY METAL PRODUCTS CO.
P. O. Box 8 West Point, Georgia

Beaver-Bilt*

Brown & Sharpe Automatic Screw Machines

Guaranteed to Operate the Same as New

THE FOLLOWING LATE TYPE, HIGH SPEED BROWN & SHARPE AUTOMATIC SCREW MACHINES ARE NOW IN STOCK FOR IMMEDIATE DELIVERY

2—No. 00 H.S. Serial Nos. 11439; 12401 (1936); Swing Stop, 3/8" Spindle Cap., 5000 R.P.M. Spindle Speed, New Turner Motor Drive. Beaver-Bilt.

2—No. 00 H.S. Serial Nos. 13883 and 13884 (1938); Swing Stop, 1/2" Spindle Cap., 6000 R.P.M. Spindle Speed, Countershaft Drive. Beaver-Bilt.

2—No. 00G H.S. Serial Nos. 13217 and 13218 (1938); Swing Stop, Motor-driven Screw Slotting Attachment, 1/2" Spindle Cap., 6000 R.P.M. Spindle Speed, Motor in Base. Beaver-Bilt.

2—No. 00G H.S. Serial Nos. 16181 (1943); 18754 (1945); Swing Stop, 1/2" Spindle Cap., 6000 R.P.M. Spindle Speed, Motor in Base. Beaver-Bilt.

2—No. 0G H.S. Serial Nos. 10836; 10837 (1945); Swing Stop, 3/4" Spindle Cap., 4150 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

3—No. 0G H.S. Serial Nos. 10858; 10859; 10861 (1943); Swing Stop, Vertical Cutoff Slide. 3/4" Spindle Cap., 41500 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

5—No. 0G H.S. Serial Nos. 13445; 13453; 13454; 13466; 13473 (1946); Swing Stop, Vertical Cutoff Slide, 3/4" Spindle Cap., 4150 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

3—No. 2G H.S. Serial Nos. 9165; 9279; 9281 (1942); Swing Stop, Vertical Cutoff Slide, 1 1/4" Spindle Cap., 3000 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

4—No. 2G H.S. Serial Nos. 10898; 10960; 10987; 11129 (1944); Swing Stop, Vertical Cutoff Slide, 1 1/4" Spindle Cap., 3000 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

1—No. 2G H.S. Serial No. 12284 (1946); Swing Stop, Vertical Cutoff Slide, 1 1/4" Spindle Cap., 2150 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

Each of the above machines is Beaver-Bilt and complete with the following standard equipment—Standard Capacity Feed Tube—Front and Back Circular Tool Posts—Work Pan—Wrench Rack—Turret Hand Lever—Full set of Feed Change Gears—Full set of Spindle Speed Change Gears—Stock Stands—Complete set of Oil Splash Guards.

TRADE-IN SPECIALS IN GOOD OPERATING CONDITION AT A FRACTION OF ORIGINAL COST

2—No. 00G High Speed Brown & Sharpe Automatic Screw Threading Machines Serial Nos. 16024 and 16025 with Swing Stops, Screw Slotting Attachments, 1/2" Spindle Capacities, 6000 R.P.M. Spindle Speeds and Motors in base. In excellent operating condition.

OTHER FINE MACHINE TOOLS AND ATTACHMENTS

4— Elgin Precision Bench Lathes, 7" x 15" Capacity, Serial No. 4EF-8282 complete with 4" Diameter Three Jaw Universal Chucks, Dog Plate, Face Plate, Draw Bar, Compound, Tail Stock, Grinding and Milling Attachments, 6 Foot Heavy Maple Benches with Steel Legs, Motor Drives with 1/3 H.P. —220/440 Volt—3 Phase—60 Cycle—A.C. Motors and Switches. Spindle will take 9/16" Diameter Collets. New 1945 and in excellent conditions. Priced for clearance.....$400.00 each.

8— Hardinge Second Operation Machines, Bench Type (less the bench), with 9/16" Collet Capacity Hand Opening and Closing Type Spindle Headstocks mounted on a 30" length Bed. These machines are Model No. 47-14372. There are not any cross slides or turret slides with these machines. Priced for clearance.....$125.00 each

1— Turret Drilling Attachment, Motor Driven, for No. 0G High Speed B. & S. Automatic Screw Machine. In excellent condition.

*Not Just RE-Built — But BEAVER-BILT!

1. Beaver-Bilt Machines are *unconditionally guaranteed* to produce work to the same tolerances as a new machine of the same type.
2. Only genuine Brown & Sharpe replacement parts are used on Beaver-Bilt machines and no change is made from standard.
3. Beaver-Bilt Brown & Sharpe machines save you up to 50% of the cost of a new machine of the same type.
4. Each machine is properly skidded, crated, and loaded on a truck free of charge.

HERE'S THE BEAVER UNCONDITIONAL GUARANTEE

Any Beaver-Bilt or "as is" machine sold by us can be operated in your own shop for a period of 30 days and, if found unsatisfactory for *any reason whatsoever*, may be returned freight prepaid for a full refund of the purchase price.

We have specialized exclusively in the rebuilding and servicing of Brown & Sharpe Automatic Screw Machines for 15 years. You profit by this valuable experience.

USED AND REBUILT MACHINERY DIVISION **PHONE: SEEley 3-0680**

Beaver Industries

1510 WEST ADAMS STREET, CHICAGO 7, ILLINOIS

UNUSUAL BUYS WITH GUARANTEED PERFORMANCE

GRINDERS

Sellers #4T Universal Tool & Cutter, NEW 1941

Sellers #6T Tool & Cutter, NEW 1942

Heald #70A NEW 1941

Rivett #104-2 NEW 1942

Cincinnati 10x36, Plain Hydraulic

Landis 6"x18", Type "C" Plain, Hydraulic, NEW 1942

LATHES

AMERICAN 36"x24' LATHE, INTERNAL FACE PLATE, GEARED HEAD, REBUILT, EQUAL TO NEW, IMMEDIATE DELIVERY

LeBlond 25"x12', Heavy Duty

Lodge & Shipley 14"x5', 5 SCD, back geared

Lodge & Shipley 14"x6', 3 SCD, Double back geared

Lodge & Shipley 18"x6', Geared Head

Lodge & Shipley 18"x8', 5 SCD, Single back geared

Lodge & Shipley 18"x8', 3 SCD, Double back geared

Lodge & Shipley 18"x8', 3 SCD, Bowl head type

Lodge & Shipley 27"x14' centers, 9" Hollow spindle

Lodge & Shipley 27"x30' centers

American 30"x32', 12 speed head

MILLERS

Cincinnati #5-48 Hydromatic Plain, Rect. Overarm

Ingersoll 42x36x12', 4 head adjustable rail

Cincinnati #4 Vert. High Power

Lees Bradner #40 Automatic Thread Miller, NEW 1942

Brown & Sharpe #5B Plain

Brown & Sharpe #3A Universal

Brown & Sharpe #4A Universal

Brown & Sharpe #2 Vertical

GORTON #3D VERTICAL, LATE TYPE

PLANERS

Gray 36x36x12' Planer

Cincinnati 10'x10'x30', 2 rail heads, 2 side heads

MISCELLANEOUS

Covel Hanchett #1130 Metal Saw Sharpener, 1943

Pratt & Whitney Bench Upright Shaving Machine, NEW 1941

GUARANTEED MACHINERY

Cincinnati Machinery Co., Inc.
219 East Second Street
Cincinnati 2, Ohio

JONES & LAMSON THREAD GRINDER—Model TG 615 Serial No. 130587

Table feed motor 1 H.P. 220/440 V. 1140 R.P.M. 3 phase 60 cycle, Spindle motor 3 H.P. 11.5 Volt D.C. 1150 R.P.M.—Max. thread dia. 6". Maximum thread length 3". Maximum work dia. 6½". Maximum work length 15".

JONES & LAMSON THREAD GRINDER—Model TG 615 Serial No. 130156

Table feed motor 1 H.P. Geared 220 Volt D.C. All other specifications same as above.

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52" KING, 54" Table

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CINCINNATI: No. 2M Vertical, Rotary table with power feed.
CINCINNATI: 0-8 Vertical
CINCINNATI: No. 4 Vertical
REED-PRENTICE: #5 Vertical 16"x60" table
SUNDSTRAND: 96 Rigidmil-Duplex (for milling cam tracks in propeller hubs or similar)
SUNDSTRAND: Nos. 0 and 00 Rigidmil.
MOREY: 12M 2-spindle Profiler
TAYLOR-FENN: M-80 Duplex Spline
TAYLOR-FENN: Vertical 6"x21" table
RICE-BARTON: Duplex Spline
VAN NORMAN: Contour Miller 10CT

BROACHING MACHINES

CINCINNATI: 2-36 Vertical Broach

THREAD MILLERS & TAPPERS

HALL PLANETARY: D Thread
LEES-BRADNER: LT 6"x36" Thread
LEES-BRADNER: 40A Thread Miller
MOREY: 12"x60" Thread Miller
MURCHEY: No. 22 Tapper, Horiz.
NATCO: Vert. Tapper 16 spindle
PRODUCTO: Hand Tapper

CAM MILLERS & GRINDERS

SUNDSTRAND: #96 Double Head Miller for cylindrical cams
VAN NORMAN: Contour Miller 10CT
MOREY: 12M 2-Spindle Profiler
HEALD: 172 Sizematic Grinder for cylindrical cams

TOOL SHARPENERS

OLIVER: 2A Face Mill Grinder
OLIVER: 510 Drill Sharpener
OLIVER: 10" Tool Bit-Template
FELLOWS: Flat Top Helical Gear Cutter
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New)
WALKER-TURNER: Bench Grinder ½ HP

GRINDERS—THREAD

EXCELLO: No. 31 and No. 33 External
JONES & LAMSON: TG-1245 External

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 and No. 23 Plain
CINCINNATI: 6"x18" Hydraulic
CINCINNATI: 10"x36" Hydraulic
CINCINNATI: No. 2 Centerless
LANDIS: 18"x18" "C" Plain Hydraulic
LANDIS: 18"x32" Type "D" Crankpin, Hydraulic
VAN NORMAN: #686 Crankshaft Regrinder
NORTON: 6"x18" & 10"x18"
NORTON: 10"x18" 45 angle wheel head

GRINDERS—RADIUS

VAN NORMAN: No. 73, 638, 649
VAN NORMAN: No. 3½ Universal

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
BRYANT: 112 Universal, Hydraulic
BRYANT: 16C16 Hole, Hydraulic
HEALD: 70A Plain
HEALD: 72A3, 72A5 Plain and Univ.
HEALD: 72A3 Sizematic Centerless
HEALD: 72A5 T-bed, Universal
HEALD: 172 Sizematic for cyl. cams
RIVETT: No. 104 Tool Room

GRINDERS—SURFACE

ARTER: A-1—8" Rotary
ARTER: A-3—12" Rotary
THOMPSON: 8"x12"x18" Type B
HEALD: 8" Rotary
HEALD: No. 22 Rotary—12" Chuck
GARDNER: 120A Opposed Head Disc
GARDNER: #6 Disc Grinder

GRINDERS—GEAR & SPLINE

PRATT & WHITNEY: 16" single and double wheel
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines, also Internal
GLEASON: No. 17 Spiral, Zerol & Hypoid

HONING MACHINES

BARNES: No. 306H Vertical
BARNES: 307 Vertical
MICROMATIC: H-510 Double End Horizontal
MICROMATIC: H-2 Single End Horizontal

LAPPING MACHINES

NORTON: No. 28 Hyprolaps
NORTON: No. 2F x 40" Diameter
SCHRANER: Model A External Cylindrical Lapper—6 heads.

GEAR & SPLINE GRINDERS

PRATT & WHITNEY: 16" single and double wheel
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines, also Internal
GLEASON: No. 17 Spiral, Zerol and Hypoid

GEAR CUTTING MACHINES

BARBER-COLMAN: No. 3 Hobber
BROWN & SHARPE: No. 6 Gear Cutter 72" diameter
CLEVELAND: No. 140 Hobber—1 spindle
FELLOWS: 6I, 6IA, 64A, 6Z2, 7 and 72 Shapers
FELLOWS: Straight Line Generator
GLEASON: #12 Rough & Finish Generator
GLEASON: 3" Straight Bevel Gear
GOULD & EBERHARDT: 12H Hobber
GOULD & EBERHARDT: 342M Cutter
HAMILTON: No. 1 Hobber, 6" diameter
SYKES: Gear Shaper 14" external, 20" internal
SYKES: Rack Cutting Machine 24"

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FELLOWS: No. 12-C Spacing Tester
GLEASON: No. 13 Universal Tester
GLEASON: No. 4 and No. 6 Bevel Gear Testers, Hand and Power Operated
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BULLARD: 24", 36" Vert. Spiral Drive
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MOTCH & MERRYWEATHER: No. 3 Circular Saw
TANNEWITZ: GH-36 Band Saw
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CAMPBELL: No. 425 Cutalator Abrasive Cut-Off
WILLIAMS: 10" Pipe & Tube Cut-Off

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AVEY: No. 2 Deep Hole Drill, 16" stroke—hydraulic
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BARNES: 201¼ 2-spindle on 4-spindle base
BAKER: 30HO 2-spindle inverted, hydraulic
BAKER: 217 Upright Heavy Duty
FOSDICK: No. 48M Upright, High Speed
PROVIDENCE ENG.: FV-6 Sensitive 6-Spindle, ⅜" capacity
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WALKER-TURNER: D950, ½" capacity, bench type (new)

MISCELLANEOUS

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BAND SAW: Tannewitz, GH-36"
CUT-OFF: Campbell, Abrasive 425 Cutalator
CUT-OFF: Pipe & Tube, 10" Williams
DIE SINKER: Reed Prentice No. 5, 16"x60" Table
DISC GRINDER: Gardner No. 6
GRINDER: Walker Turner ½ HP Bench Type
LATHES: Blount Polishing 12"x48"
MOLDING: Jolt Rollover, Osborn No. 602
PRESS: Screw, Gen. Flex. 3 ton
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RIVETER: Gen. Engr. 24" throat
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19"x74" centers LeBlond 12-speed Grd. Hd., MIL, taper
20"x94" centers American Grd. Hd., MD
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No. 2 Cincinnati H.P. Plain, MD
No. 2-B Brown & Sharpe Heavy Plain
No. 2-A Brown & Sharpe Univ., MD
No. 2-M Cincinnati Univ., MD
No. 3-B Milwaukee Univ., SPD
No. 4 Cincinnati H.P. Univ., Lima Drive
No. 4-B Brown & Sharpe Heavy Plain, MD
No. 2 Knight Vert. Miller & Driller, MD
No. 4 Cincinnati Vertical, SPD

PLANERS

30"x30"x8' Gray, s/c speed-variator MD
30"x30"x18' Whitcomb, 2 heads, MD
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20" Gould & Eberhardt High Duty, cone
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GRINDERS

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No. 2 Diamond 12"x36" Surface, BD
No. 3 Abrasive 8"x22" Surface, BD
14—W Hammond Carbide Tool, MD, late
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20"x144" Landis Plain Cylindrical

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24" Bullard "New Era" Vert. Turret Lathe
48" Gisholt, arr. MD
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MISCELLANEOUS

Oliver Heavy Duty Die Maker, late
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16"x54", 18"x78", 28"x48", 28"x120", Monarch latest type Lathes, all built after 1942.
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Bullard Multaumatics 12" type D
24" & 36" Gould & Eberhardt Shaper, 41'
60" Bickford Vertical Boring Mill
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Prod. Lathe Sundstrand #12, late
Prod. Lathe, #R-14 Lo-swing, late
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#35 Excello Thread Grinder
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Lucas #43 Precision Boring Mill, 5" Bar. Table 36"x72", 16 speeds. A.C. M.D.
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Pratt & Whitney 14"x36" Surface Grinder New 1943
Libby 4H—Sliding Bed Turret Lathe, 12½" Thru Spindle, 84" Swing
Gorton #3L Three Dimensional Pantograph 1942 A.C. M.D.
BLISS Power Presses, all sizes and types
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Bullard 24", 36", 42" VTL. New Era
Cleveland 2½" Bar Cap.
Giddings & Lewis No. 0, 3" cap.
Giddings & Lewis No. 32, 3½" cap.
King 42" & 72" Vert. 2 rail heads
Lucas No. 31 Precision, 3" bar
Niles-Bement-Pond 4" Bar
Niles-Bement-Pont 4½" Bar
Niles-Bement-Pond 60" Vert.

DRILLS AND RADIALS
American 3' sensitive motor on arm
Buffalo #2 Motor Spindle
Cincinnati Bickford 6' x 13" col.
Natco B2 24 spindle
Sibley 24" & 28"

ENGRAVERS
Gorton #1A 2 Dimensional
Gorton #3B 3 Dimensional

GEAR EQUIPMENT
Barber-Colman #12 Hobber (2)
Brown & Sharpe #13 Cutter
Fellows High Speed Shapers #7, 712, 72, 725
Flather 72" Cutter
Gleason 3" Straight Bevel Generator
Gleason 11" Bevel
Gleason #4 Angular Bevel Tester
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter, Univ.
National Broach Red Ring Lapper
Schuchardt & Schutte #1 Hobber

GRINDERS, MISCELLANEOUS
Brown & Sharpe #2, #3 Univ. #13 Tool
Cinn. 12 x 48" Univ.

Covel #91A Univ. Tool & Cutter, Hammond #4
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic, #1 Tool
Landis 12"x36" Univ., Latest, #6 Thread
Landis 6" x 30" Type C Cyl.
Norton 6"x18", 6"x30" Type C cyl., 10x18"
Norton 14"x48" Type C Univ.
Oliver #510 Drill Pointer, Sellers 4G, 6G, Black Diamond
Porter Cable Belt WGB, G8; Grenby Int.
Pratt & Whitney Radius #R6, K.O. Lee Tool

GRINDERS, SURFACE
Abrasive 3B 8x24", #33, #34 Vert.
Blanchard #16, 30" Mag. Chuck, B & S #2B Motor Spindle
G & L #45 12" x 24" Hyd. Feed, #5 10" x 36"
Heald 22—12" chuck, Arter 12"
Norton 10" x 36" Hyd.
Pratt & Whitney 12 x 36" Vert.
Thompson Hyd. 6 x 10 x 18", 6 x 12 x 18"

LATHES
American 20" x 8' Bed G.H. Lathe
Carroll Jameson 15" x 6' Geared Head
L & S #2A Duomatic, Like New, #3 Duomatics
Hardinge Precision 9", 1" Collet Cap., Rivett
Hendey 12 x 30" T.A., collets, etc.
Hendey 14" Yoke Head Lathes
LeBlond Regal 10" x 3' bed
Putnam 36" x 22'
Putnam 42" x 17'
Sebastian 12" x 4' G.H.
Wickes 32" x 35' Geared Head

MILLS, PLAIN, UNIVERSAL & PROD.
Brown & Sharpe #000, 21, #2A Univ.
Burke #4 Plain & Univ. Vert. Hd.
Cinn. 08 PL & Vert.—Rise & Fall
Cincinnati, 1M Univ.
Kent Owens IV, 1M
Sundstrand 00, 0 Rigidmil, Whitney Hand Mills

MILLS, VERTICAL
Brown & Sharpe #3 single pulley drive
Cincinnati #4, 08 Vert.
Morey #12M Profiler, 2 sp.
Pratt & Whitney #12B Profiler 2 Sp.

PRESSES
Bliss 645, 650 HI-Production Presses
Bliss 20, OBI, 58, 62, 169 OB.
Bliss 4½ Double Action, Rail Feeds
Bliss #78½, 330 Ton SS
Bliss 3½A Double Action Toggle
Ferracute EG54, 400 Ton Knuckle
Niagara A13½, O.B.I.
Toledo 400 Ton Knuckle Joint #663
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing

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500 Ton Lake Erie, 35" x 36" Platen 36" stroked opening
500 Ton Shaft Straightener 24' Long Bed. Watson Stillman
125 Ton Southwark Press, Bed 96" x 30". 30" stroke, 2 to 4 ft. opening
50 Ton Burroughs 8" stroke 18" x 17" Platen, 18" opening
80 Ton Wilson Press, 51"x24" Platen, 11½" St. 13" opening
50 Ton Hannifin, 20' St. 30 x 22 Bed—24" opening
35 Ton Oil Gear Straightener
50 Ton Stokes Molding Press
MISCELLANEOUS PRESSES
550 Ton Southwark, 42" x 32" Platen 28" St. 48" opening
300 Ton Watson Stillman 24 x 20" Platen 11" St. 21" opening
All Hydraulic Equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your Hydraulic problems.

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Air Hydraulic Presses—Arbor Presses #6C Famco—Band Saws Kalamazoo—Drill Presses all sizes—Hydraulic Press Northern 20 Ton—Injection Molders, 1 ounce—Power Presses, OBI, 1, 4½, 5, 7½, 10, 15, 20, 30 ton—Shaper, 7" Amco, 8" Shaperite—Shaper, Sheldon 12"—Shears, Foot 22" to 8', 16 & 18 ga.—Shears, Power, 3'x18 gauge to 10'x 10 ga.—Welders, Arc, Seam, Spot all sizes—Vert. Milling Attach. Holce H.S.—Motors, Grinders, Buffers, all sizes, etc.

TURRET LATHES
Acme 6W Fox
Brown & Sharpe, #1, 2 Hand
Gisholt, 2L, Foster #3B
Jones & Lamson 2½" Saddle Univ.
#4R Libby 2" Cap. Univ.
Warner & Swasey #1A, 2A, #5 Univ.

MISCELLANEOUS
Automatic B & S #00G
Automatic 4 Sp. 1⅛" Cone
Band Saw: Tannewitz #36M, Marvel #8, DoAll Zephyr 36"
Filers—Do All Band Filer
Filers—Grob Band Filer
Hacksaw: Marvel #6A, #6, #9; Peerless 6"x6"
Honer: Micromatic #H-1
Keyseater: Davis, Baker, M & M

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1—Niles Bement Pond Wheel Press—600 ton heavy duty for locomotive wheels

1—36 BM Gould & Eberhardt Bevel Gear Rougher—3 spindle—for bevel, spur gears and clutches

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4" Niles Bement Pond floor type
4½" bar Lucas, No. 33
5" bar Jones planer table type

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24" Bullard vertical turret lathe
38"-44" Niles vertical turret lathe
51" Bullard, old style
52" King
84" Gisholt
100" Niles Bement Pond extra heavy

GEAR HOBBERS

No. 8H, 12H, 16HS & 18H Gould & Eberhardt
No. 130 Cleveland Rigidhobber
Nos. 1 & 5A Lees Bradner
No. 7125A Fellows gear shaper

GRINDERS, CYLINDRICAL

6"x18", 10"x18" & 14"x36" Landis hydraulic
6"x18" No. 10 & 6"x32", No. 11 B & S mechanical
10"x24" & 16"x72" Landis mechanical
10"x36" Norton hydraulic semi-automatic
10"x18", 10"x30" & 10"x50" Norton mech.
14"x36" Landis hydr. univ.

GRINDERS, SURFACE

Nos. 10 & 16A2 Blanchard rotary
12" & 16", No. 22 Heald rotary
8" Pratt & Whitney rotary (tub)
9"x24", No. 34 Abrasive vertical
14"x36" Pratt & Whitney vertical
8"x24", No. 78 Wilmarth & Morman
8"x22", No. 3 Abrasive

GRINDERS, TOOL & CUTTER

Oliver template tool bit
Nos. 1 & 4T Sellers
Gisholt for lathe & planer tools
18" Whitney wet tool
No. 13 Brown & Sharpe univ.

ENGINE LATHES

18"x6' Lodge & Shipley
16"x10' American
18"x8' Rockford
26"x120" centers Wickes
30"x16' Lebland
36"x108" centers Bridgeford
40"x80" centers Leblond

MILLERS, KNEE TYPE

Nos. 2AS Milwaukee plain
No. 3 Van Norman duplex
No. 3 Oesterlein
Nos. 1-12 & 1-18 Cincinnati production

SHAPERS & PLANERS

20" G. & E. shapers
20" Gemco univ. shapers
24" Columbia univ. shaper
16" Bement Miles slotter
30"x24"x6' Liberty openside planer
36"x36"x8' Gray planer
48"x48"x12' Cleveland openside planer

MISCELLANEOUS

AUTOMATIC—⅞" & 1¼" Cone 4 spdl
BROACH—15 ton No. V3 Lapointe
DRILL—24", No. D4 Colburn heavy
DRILL—6' Dreses radial, old style
HAMMER—No. 5N Nazel pneumatic
HEADER—⅜", No. 30 ODSS Waterbury Farrel
HONER—No. H1 Micromatic
KEYSEATER—Nos. 4 & 5 Mitts & Merrill
LAPPER—No. 26 Norton Hyprolap
MARKING MACHINE—No. 25 Schmidt
OIL GROOVER—No. 1 Fischer
PIPE MACHINE—2" Landis
PRESS BRAKE—No. 40-8 Dual
PRESS—1000 ton Bliss coining
RIVETER—Nos. 3A & 5A High Speed
TAPPER—Baush radial arm

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late type
MACHINE TOOLS

AUTOMATICS

1⅜" 6-Spindle New Britain Model 206
2½" Cleveland Model B Single Sp. Bar
3¾" Cleveland Model A Single Spindle

BORING MILLS—Horiz. & Vert.

6" Bar Betts Horizontal Floor Type
24" Bullard Vertical—Spiral Drive
36" Bullard Vertical
42" King Vertical
44" Niles 20" Bar Travel, Fast Traverse
50" Rogers Vertical
100" Niles Vert. 39" Bar Travel, Pow. Rap. Traverse

BROACHES

20 Ton Amer. 36" Stroke Type VP Hyd. Broach
37½ Ton LaPointe 68" Str. #4L Horiz. Broach
Zoger Vertical Hydraulic Broach

DRILLS & RADIALS

S.S. Aveymatic No. 2 M.T.
S.S. Baker No. 314, No. 5 M.T.
S.S. Edlund No. 2B, No. 3 M.T.
S.S. Foote-Burt #23½ HiDuty #6 M.T.
12-Sp. Baker Model 60-HO
5'13" Column Carlton Radial
5'13" Column Cinn.-Bickford Radial Dbl. Base
6'19" Column American Radial
Model RD-1175-J Walker-Turner Rad. Drill

GRINDERS

#2 Cinn. Centerless (not filmatic bearings)
10"x18" Landis Type "C" Plain
10"x36" Norton 45° Angular Cylindrical
14"x60" Brown & Sharpe No. 4 Universal
18" Double End Gardner No. 218 Disc Gr.
36" Rotary Disc Grinder, Besly No. 342
No. 12 Bryant Flange Type Work Spindle
No.-16A-16 Bryant Hole & Face Grinder
No. 72-A Heald Internal
No. 72-A3 Heald Sizematic
30"x160" B.C. Lobdell No. 3GH Roll Grinder
Hammond Type WR-2 High-Speed Snagging Gr.
8"x24" Abrasive No. 33 Vert. Surf. Grinder
No. 31 Ex-Cell-O Precision Thread Grinder
10"x18" Fitchburg Angular Spline Grinders

PLANERS

Chandler 30"x30"x8'6" Planer, Table 12'x27"
Cincinnati 48"x36"x18' Planer

LATHES

27" B.C. Lodge & Shipley No. 3 Duomatic
5"x24" Seneca Falls Model "U" Low-Swing
12"x18' W.C. Lipe Carbo Lathe
No. A Libby Turret—3½"x18"
No. 5D Potter & Johnsons Turrets
No. 7 Foster Turret 3"x21" G.H.—Bar Feed
2½"x24" Jones & Lamson Flat Turret Lathe
20"x48" Monarch Model CU Engine Lathe
21"x7' LeBlond G.H. Engine Lathe with T.A.
30"x60" Lodge & Shipley Engine Lathe
36"x16' Boye & Emmes Engine Lathe
42"x20' Niles-Bemont-Pond 144" B.C.

MILLS

Brown & Sharpe No. 000
Brown & Sharpe No. 3A Univ. Horiz.
3-24 Cincinnati Hydromatic
Hardinge Horizontal & Vertical
28"x33" Ingersoll Horizontal Slab Mill
24" Cincinnati Duplex

MISCELLANEOUS

No. 3 Gleason Spiral Bevel Gear Generator
18" Gleason Hypoid Gear Lappers
No. 16HS Gould & Eberhardt Spur Gear Hobber
No. 4-48 Brown & Sharpe Gear Cutter
7½ Ton Toledo No. ½ OBI
30 Ton V&O 1¼5 OBI, 2" Stroke
35 Ton Bliss #303½ S.S. S.C. Punch Press
100 Ton HPM Hyd. Bed 18x18", 12¼" Stroke
18" Betts Slotter
30" Morton Horizontal Draw Cut
No. 61 Fellows Gear Shaper
Ajax 1" and 3" Upsetter
Foster 4"x18" Superfinisher
Manville 150 Ton Header, ½x8" Capacity
No. 13 Williams & White Comb. Punch & Shear
Warner & Swasey No. 11 Tapper
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MONARCH 20"x72" centers Model "M", 16 spd. gr. hd. 22½" swing, Monarch auto. sizing controls —(late).
PRATT & WHITNEY Model "B", 10"x30" motor in base.
AMERICAN 16"x6' and 18"x8', 12-Spd. Gr. hd. Pan bed M.D.
HENDEY 12"x30" etrs., 18-Spd. gr. hd., motor in base (1942 vintage) Timken brg.—collets, taper attachment, actual swing 14½"—1000 RPM.

TURRET LATHES

WARNER & SWASEY #4 Universal Ser. #148,-786, bar feed, M.D.
WARNER & SWASEY #6 Geared friction head, M.D. chucking, 2¼" capacity.

HORIZONTAL BORING MILL

GIDDINGS & LEWIS #8, 3½" bar, face plate to outer support 60"x7'. #5 Morse taper.
FOBDICK #0, 3½" bar, V-belt M.D. with outboard support.

VERTICAL BORING MILL

SELLERS 90" Vertical—swivel heads—M.D.
BULLARD 24", 36" & 42" "New Era" type, vertical, 3-Jaw and 4-Jaw chuck tables.

FORGING EQUIPMENT

BRADLEY 100# Rubber Cushion Helve Hammer—150# Upright strap hammer, and 300# Upright helve hammer.

AUTOMATIC SCREW & CHUCKING MACHINES

2—BROWN & SHARPE #2—belt driven.
BROWN & SHARPE #2 Hand Feed Screw Machine—(late type) with collets, stock stands.
POTTER & JOHNSTON #6 DRE chucking and turning, swing 34", Timken bearings, 5 face turret.

SURFACE GRINDERS

(BRAND NEW) THOMPSON 8"x10"x24" Hydr. Surface—wet grinding attchmt.

BLANCHARD #11, Hi-Power Rotary Vertical Surface, Ser. 3887, 10" chuck—generator set.
BLANCHARD #10, Hi-Power Rotary Vertical Surface Grinder, 10" dia. chuck—segment wheel mount.

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No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
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4 spindle 2¼" Cleveland Model "K", m.d.
2¼" Gridley Single Spindle, m.d.
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4½" Cleveland Model A, m.d.
5½" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
7¾" Cleveland Model A, m.d.

HORIZONTAL BORING MILLS

3½" bar Cincinnati-Gilbert Floor Type, m.d., late type
3½" bar Landis Floor Type, m.d.
4" bar Detrick & Harvey Floor Type, m.d.
No. 45 Giddings & Lewis, m.d., 4½" bar
5" bar Barrett, m.d.
5½" bar Niles, m.d.
10" bar Sellers Floor Type, m.d.

VERTICAL BORING MILLS

24" Bullard New Era, m.d., with side head
42" Colburn, m.d., 1 swivel head, 1 turret head, p.r.t.
42" King, belted m.d., 2 swivel heads, p.r.t.
48" Putnam H.D., m.d., 2 swivel heads
100" Niles Heavy, m.d., p.r.t.
100" Niles Extra Heavy Pattern, m.d., p.r.t.

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3' American Sensitive, cone
4' American Sensitive Adjustable Speed, m.d. on arm, 9" col.
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4' Niles-Bement-Pond Semi-Universal, m.d.
5' American Triple Geared, 13" col., gear box
5'-13" col. Cincinnati-Bickford, m.d.
5' Cincinnati-Bickford Full Universal, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d. on arm
5' Prentice, m.d., Plain
6'-15" Cincinnati-Bickford, with 7' arm, m.d.
6' Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
7'-17" Dreses, gear box, m.d.
8'-16" American Triple Purpose, m.d. on arm

BALL BEARING DRILLS

Model D 1100B Walker-Turner Bench Type, 20" size, brand new
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 2—12" Foote-Burt Single Spindle, m.d.
No. 3 Allen, belted m.d., 12" overhang, No. 3 Taper
No. 3 Type MAS Avey, m.d., 12" overhang, latest
No. 4 Fosdick, 8" overhang, belted m.d., No. 2 Taper
No. 5M—10" Fosdick, m.d.
1 spindle No. 3 Avey Type B, style MA6, m.d., No. 3 Taper, latest
2 spindle Allen, belted m.d., 9" overhang
2 spindle Avey, size No. 1, Type B, style VNP, m.d., 8" overhang
2 spindle No. 3 Avey, belted m.d., p.f.
2 spindle No. 48M Fosdick High Speed, m.d., 12" overhang, No. 2 Taper
3 spindle No. ½ Avey Heavy, direct m.d., latest
4 spindle No. 3 Avey, belted m.d., No. 3 Taper, 12" overhang
6 spindle No. ½ Avey, model MA8, m.d., latest
6 spindle Leland & Gifford, No. 2 Taper, m.d. on each spindle
6 spindle 2B Edlund, m.d., No. 2 Taper
6 spindle No. 3 Avey, belted m.d.
6 spindle Henry & Wright, m.d., 15" overhang, No. 2 Taper

HORIZONTAL DRILLS

Morris Horizontal Mor-Speed, m.d.
No. ½Bx30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½Bx50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1Bx74" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d., latest
No. 1½x105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1½x105" Pratt & Whitney 2 spindle Gun Barrel Rifling Machine, m.d.
No. 1 Pratt & Whitney 2 spindle Deep Hole Drill, belted m.d.
No. 1½ Pratt & Whitney 2 spindle, m.d., older type
Pratt & Whitney Rifling Machine, belt
5 spindle Detroit Semi-Automatic, belt
2 spindle No. 410 W.F. & John Barnes Deep Hole Drill, m.d.

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No. 3 Baush, m.d., 10x30" head, 15 spindles
No. 3 Baush, m.d., 20x40" head, 15 spindles
No. 10 Foote-Burt Fixed Center, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
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GRINDERS:

Thread, #105 Sheffield
#8 Cincinnati Centerless
#1 Cincinnati Chucking
#12 Brown & Sharpe, 6 x 30 cylindrical, and #5 B. & S.
#8, #223, #230 Gardner Disc
#226 Besley, #220 Badger Opposed Disc
#16 Blanchard, Rot. Surf. 26" Chuck
#44 & #46 Excello Carbide Tool
14" Pratt & Whitney Vertical Surface Turret, #3A Warner & Swasey

LATHES:

Production, 4 x 60 & 6 x 12 Lo-Swing
LEVELLER, 72" Aetna-Standard
#4 Cincinnati, Vertical
#8 Defiance Horiz. Boring, 4½"

MILLS:

#1B Milwaukee Horiz., Plain
1-8 Kent-Owens Prod. Mill

TAPPERS, 2 to 4 spindle Webster-Perks

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DRILL PRESSES—Minster #2D, 2½" cap. Hvy. Snyder, 1½", 28" swing.

GEAR SHAPERS (2)—Fellows #6

LEPEL—7½ KW Induction heat unit (late).

LATHES—Engine, Logan, q.c., 10"x4' cabinet. Turret, Midland #5 Univ., 2½" bar & chuck (1942).

TURRET—Oster—601 W.D. 1½" (1944) Turrets, 1½", 1", 1-1/16" hand screws, cone type.

MILLERS—Newton Vert. 42" Rotary Hvy. Cinc. #3 Vert. Hi Power Br. & Sh. #3 Universal, #2 Plain

PUNCH—Sq. end, Smith 1-1/16" thru ⅜".

ROLLS—Angle—Bertsch 3"x3"x⅜".

ROLLS—Bending—H. & J. 30'x¾", Pyr. Southwark 15'x3", Vert. Farnham 6' Forming x ⅜" Radius x 1/32" Alum.

SHEARS—Square—Famco Power 36"x18g (new). Square—Pexto 10'x10g. (1943). Alligator (#2) 24" blade, 3" Rds. Rotary—Quickwork #50A, 48"x⅜" (Late). Pels, Rounds & Squares, Angles.

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No. ½B P&W Two Spindle Reaming Machine, 1944

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No. 12 FELLOWS Gear Shaver

No. 1LMS LELAND-GIFFORD 6-spindle Drill, 1942.

No. 725A FELLOWS H.S. Gear Shapers

H-S BARNES "Hydram" S.S. Drill.

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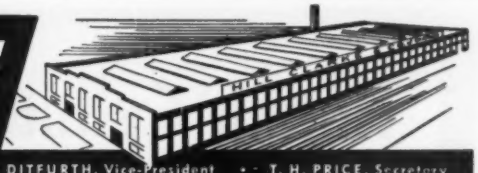

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1 Spdl—26" Sw—No. 2 LMS L.G. Hyd.
2 Spdl—24" Sw—No 2 Avey matic
3 Spdl—15" Sw—No. 2—MA 6—Avey
4 Spdl—24" Sw—No. 3 Avey
6 Spdl—14" Sw—No. 2 LMS L.G. Hyd.

GEAR MACHINES

No. 61-A Fellows Gear Shaper (1942)
No. 7 Fellows Gear Shaper (1942)
No. 72 Fellows Gear Shaper
No. 72-A Fellows Gear Shaper (1942)
11" Gleason Bevel Gear Generator
12" Gleason Bevel Gear Generator
No. 13 Brown & Sharpe Spur & Bevel
No. 1 Whiton Auto. Gear Cutter
No. 6 Gleason Bevel Gear Tester (1942)
28"-36" Goss Hobber

BORING MACHINES

No. 31 Lucas 3" bar, M.D.
3" Bar Universal Horizontal Boring
Rockford—3½" Bar
34" King Vert. Bor. Mill
42" Bullard New Era
42" King

GRINDERS

6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
10"x72" Landis Type C Hydraulic
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x50" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
14"x120" centers
16"-40" gap x 120" centers
18"x96" centers
18"-30" Gap x 96" centers
20"x96" centers
23"x36" centers
24"-32" Gap x 144" centers
No. 34 Abrasive Surface Grinder (1943)
No. 22—12" Heald Surf. Gdr.
No. 25-A Heald Surface Grinder
No. 104 Rivett Internal Gdr. (1943)
No. 72-A-3 Heald Internal (1942)
No. 72-A-5 Heald Internal (1942)
No. 72-A-5 Heald Extended Bridge Internal
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Gdr.
No. 81 Heald Centerless Internal

LATHES

18"x6' American Gdr. Head, M.D.
18"x8' American Gd. Hd.
Model R-14 Seneca Falls Lo-Swing

MILLING MACHINES

No. 3B Milwaukee Plain
No. 3 Cincinnati H.P. Universal
No. 4 Cincinnati H.P. Plain
No. 5 Cincinnati H.P. Plain
No. 00 Cincinnati Plain
No. 2½-B Milwaukee Vert.
No. 2—18" Sundstrand-Electromil (1942)
No. 2—24" Sundstrand Electromil (1942)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 45-48 Cin. Hyd. Tracer (1941)
6"x26" Lees-Bradner—Model LT (1943)
12"x54" H.T. Lees-Bradner Thread Miller (1943)
10"x48" Hanson-Whitney Thread (1942)
10"x80" Pratt & Whitney Thrd. Mill
48"x24"x12" Ingersoll Slab Miller, 4 Hds.

MISCELLANEOUS

18" Dill Slotter
36" Morton Draw-Cut Shaper (1945)
18" Newton Slotter
10"x10" Rasmussen Saw, Stock Fd.
4" Toledo Pipe Machine (1944)
No. 0 Bickwell Tapper
Baush Radial Tapper
No. 307 Barnes Hone
Model H-7 Micromatic Vert. Hone, 1 Spdl.
Model 200 Micromatic Horiz. Hone, 1 Spdl.
Model H-2 Micromatic Horiz. Hone, 2 Spdl.

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

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BORING MILLS, 3½" & 4" bar Landis Floor (3)
BORING MILL, 60" Colburn Vert., 2 Hds., PRT
BORE-HONE, Barnes, 10' stroke, 6" bore, '42
BRASS LATHE, 21" Asme, Late, Hardened Ways
BROACH, No. HP15 Lapointe, Hyd., Horiz., 1944
RADIAL, 5'12" cel. Amer. Trip. Purp., M-on-arm
RADIAL, 5'14" cel. Amer. Trip. Purp. AC, M.D.
RADIAL, 8' 19" & 16" Cel. Amer., M. on arm. (2)
DRILL, 28" Colburn No. 6, 3" capty.
GEAR GENERATOR, 3" Gleason, Late
GEAR PLANER, 11" Rienecker, Bevel
GEAR SHAPER, No. 75 Fellows High Speed 01A, 04, 04A, & 045A Fellows
GRINDERS, 20"x120" Landis, Cyl., Hyd., AC
GRINDER, 10"x48" Cinc., Cyl., M.D.
GRINDER, No. 16Y2B Bryant, Int., 1943
GRINDER, No. 174 Heald Gap, int. 54" sw., '42
GRINDER, No. 72A5 Heald Internal, 1943
GRINDER, No. 75A Heald, Int. Hand Feed
GRINDER, No. 13 B. & S. Univ. M.D.
LATHES, 56"x15' Con. Niles, blocks to 66", M.D.
46"x20'6" cen. Simmons, like new, '42
32"x25' cen. Sommerfeld, 2 T.A., 2 carr., '42
24"x12' bed L. & S., Modern Timken Spin.
22"-24½"x48" cen. Skoda, New
20"x54" cen. Reed Pron., T.A., '47
20"x48" cen. American, T.A., (2)
16"x6' Hendey, T.A., AC, M.D.
15"x80" cen. P & W., T.A., Collets
14"-16½"x54" cen. Bradford, T.A., '43
No. 10 LeBlond Pro. 28" sw. x 36" cen.
TAPPERS, Nos. 1 & 2 Bakewell (4)
TURRET LA., 29" Libby "C" 4½" capty.
Nos. 3 & 4 Gisholts, Late
No. 1B Foster Univ., 2" capty. (2)
RIGID-MIL, 96" Sundstrand, Tble. 30"x120"
THREAD MILLER, 12"x60" Morey Shields, '42
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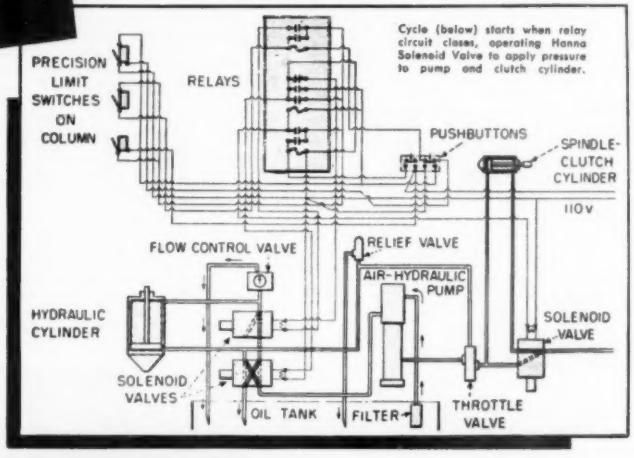

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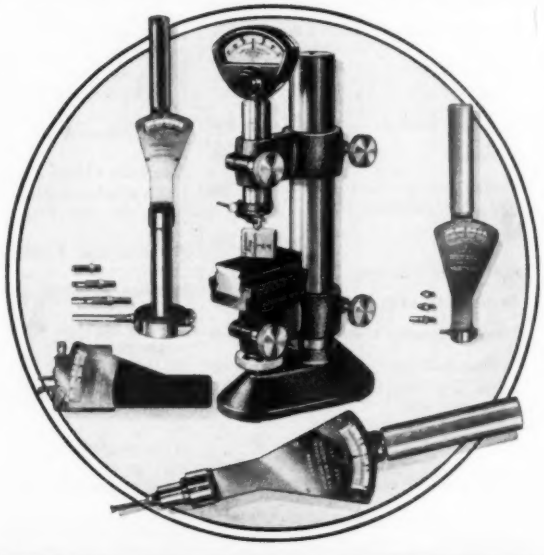

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What gives the razor blade its smooth face?

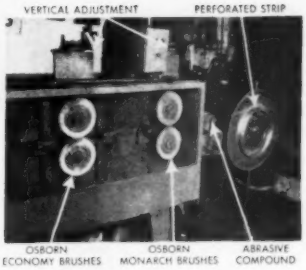
...a brush! *Here's a double-edge idea to improve your cleaning and finishing operations:*

Now, after hardening razor blade strip, progressive manufacturers are (1) removing heat-treat scale and (2) preparing the strip surface for name-etching . . . *all in one speedy automatic brushing operation.* The continuous, hardened strip passes through a finishing compound, then between two counter-rotating Osborn Monarch® Brushes, then between two Osborn Economy® Brushes. These two Osborn brushing stations do the work of 6 stations of the former method. The strip comes out uniformly clean . . . micro-smooth.

Can you "double up" like this on cleaning and finishing? Or can you use new Osborn brushes and techniques in other ways to speed your output and cut costs? An **O**sborn **B**rushing **A**nalyst will gladly survey your plant and make suggestions. Call or write *The Osborn Manufacturing Company, Dept. 424, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

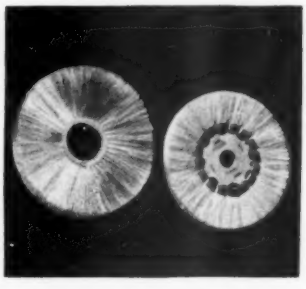
OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



AUTOMATIC BRUSHING MACHINE *for cleaning and finishing hardened high-carbon steel razor blade strip. Brushes rotate at 3450 rpm, finishing strip for hundreds of thousands of blades per day.*

FINISHED STRIP *for double-edge razor blades. Manufacturer uses same type of equipment for single edge blades and cutting tool blades. Brushing removes heat-treat scale and prepares strip for etching.*



"DOUBLE-DUTY TEAM." *Left: Osborn Economy Brush. Right: Osborn Monarch Brush. The two brushing stations do the work of 6 stations of the former method.*

Greater Productivity

...More Horsepower...Less Man Power

TODAY American Industry is under pressure to meet fantastic demands. Only yesterday, intense competition was the problem. Manufacturers have found the answer to both situations in more productive machine tools. The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES

LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES

NEW BRITAIN

Automatics

10 new features—31 TIMKEN® bearings in new Kearney & Trecker milling machine

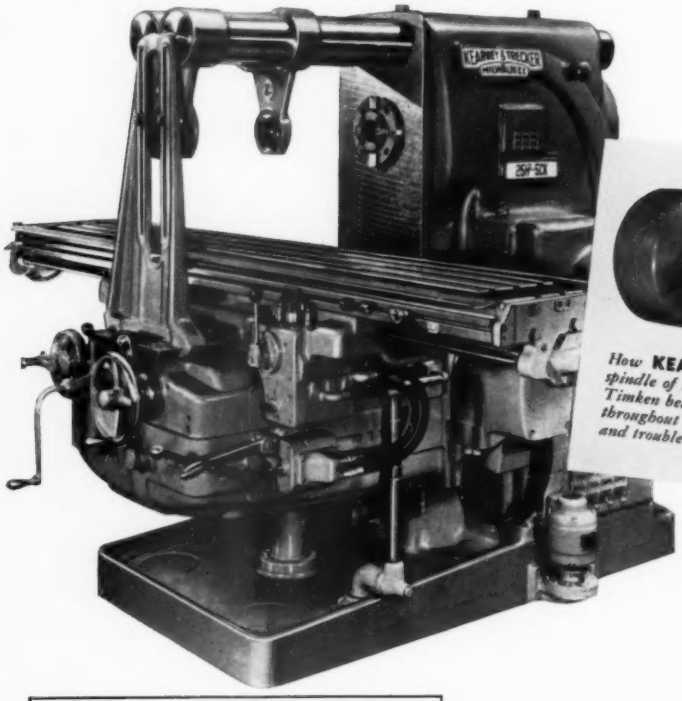
THE new Kearney & Trecker Model "CK" Milling Machine shown below has 10 outstanding new features, ranging from non-glare rapid-set dials to a new and heavier solid-back, sponson design column. And throughout the spindle assembly, feed drive gear box and speed train gear box, there are 31 Timken® bearings to insure greater rigidity, lasting precision and long, trouble-free operation in this new knee-type milling machine.

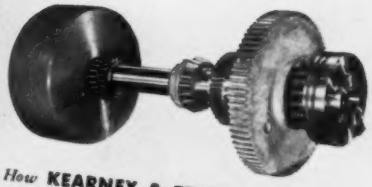
Because of their tapered construction, Timken bearings carry any combination of radial and thrust loads. In the gear boxes, Timken bearings help prevent wear by holding gears and shafts in positive alignment. On the three-bearing spindle, Timken bearings insure long-lasting precision, and permit pre-loading to any desired degree.

Made of Timken fine alloy steel—the finest ever developed for tapered roller bearings—rollers and races have case-hardened, wear-resistant surfaces and tough, shock-resistant cores. Line contact between rollers and races gives extra load-carrying capacity. True rolling motion and incredibly smooth surface finish practically eliminate friction.

Remember, no other bearing can give you *all* the advantages you get with Timken bearings. They're backed by 50 years of bearing research and development and are first choice throughout industry. Whether you build or buy machine tools, insist on bearings with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.





How **KEARNEY & TRECKER** *mount the spindle of their new "CK" milling machine on Timken bearings. 31 Timken bearings are used throughout to insure extreme accuracy, long life and trouble-free service.*

IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

Obviously a big advantage *above* the line gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST —▯— LOADS OR ANY COMBINATION